THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XI. Copyright, 1882, JAMES R. OSGOOD & Co. NO. 315.

JANUARY 7, 1882.

Entered at the Post Office at Boston as second-class matter.

CONTENTS.

THE report to which we recently referred, that an effort was making for the displacement of the present Supervising Architect of the Treasury Department, and the appointment in his place of General Steinmetz, a partner of Mr. Mullett, and connected with him in his administration of the office which Mr. Hill now occupies, was immediately denied by Mr. Mullett himself in a letter published throughout the country. More recently, however, the story has been revived in a different form by a correspondent of the Cincinnati *Commercial*, who asserts that a formal application has been filed in the office of the Secretary of the Treasury by Mr. Mullett himself, for the position of General Superintendent of public buildings in course of erection. This office does not at present exist, if we are correctly informed, and although Mr. Mullett's well-known energy might fit him admirably for the discharge of such duties, it is hardly wise to create an unnecessary office for the sake of securing his services. Under the present system of employing a resident superintendent to follow in detail the construction of each important building, making him responsible to the Supervising Architect, whose frequent visits keep him constantly informed of the direction which his superior wishes to be given to the work, the immense building business of the Treasury Department has been carried on of late years with remarkable facility and success. From the interruptions, failures, investigations and scandals which once so frequently attended the execution of public works, the history of the Department has for some time been happily free, and until some evident necessity shall show itself for a change in the present manner of administration, the interest of the country will be promoted by refraining from interference with it.

THE day before Christmas a fire occurred in New York which destroyed property whose value is estimated at more than three million dollars. The building burned was a warehouse on South Street, near the lower end of the city, and contained, as such storehouses in New York usually do, an immense amount of goods, in the present case principally consisting of raw and manufactured tobacco, wines, silks, tea, and East India products. For about an hour after the fire was discovered it smouldered slowly among the bales and cases, generating much smoke, but little flame, until the engines arrived, and openings were made for throwing in water. Then the blaze burst out, and within an hour, although eleven engines and two fire-boats were on or near the spot, everything in the structure was destroyed. This catastrophe, together with the Morrell conflagration, will bring the total of fire losses in New York for 1881 to nearly double the average sum, and will also, we hope, open the eyes of underwriters to the fact that the average city storage warehouse of the present day is of much less value as a protection for goods against fire than a cotton tent would be, or an open shed enclosed by a wooden fence. If fire should be kindled among goods piled under such slight shelters as these, any burning bales could be reached at once, pulled out with hooks, or extinguished by a well-directed stream of water, but a vast heap of merchandise, packed tier on tier, without any separation into isolated portions, and closely surrounded by thick brick walls and iron shutters, is practically out of reach of any efforts to save it, and it must be, and generally is, soon left to its fate.

A PRACTICAL experiment in the application of revolving sprinklers to the protection of theatres from fire was tried a few days ago in New York, in the presence of two of the Fire Commissioners. The arrangement was devised by Chief Engineer McCabe, and consists simply in a series of revolving nozzles, like the lawn-sprinklers in common use, supplied by tanks over the stage, and set so near together that the showers from them will intersect, completely drenching everything under them, while the whole can be controlled by a single valve at any part inside or outside the theatre. For trial, a space in West Third Street, under the Elevated Railway tracks, was selected to represent an imaginary stage, and four sprinklers were attached to the under side of the railway trusses above, and supplied through a hose by a steam fire-engine, throwing six hundred gallons of water per minute. In less than a minute after the signal was given, the space representing the stage was flooded with water, to the great satisfaction of the Commissioners, who perceived at once the efficiency of such an apparatus in checking a conflagration. In practice, the "flies" of a theatre stage are so divided up by borders, bridges, lights, reflectors, and machinery of all kinds that the number of sprinklers should be greatly multiplied. Thirty or forty small ones, scattered between the borders and wings, would be infinitely more effective in applying water at once at the needed point than a few large ones, whose jets might be kept from the flames by an intervening obstacle; but with such a number, carefully or automatically put in operation, it is difficult to see how a fire in such a situation could gain any headway.

A SINGULAR accident took place at Shanesville, Ohio, during an entertainment on the night preceding the new year. Apparently without warning the floor of the room in which the company was assembled gave way, precipitating about two hundred persons to the story below, killing two instantly and fatally injuring ten more. In the midst of the confusion the mass of débris took fire from the lights, and many, unable to extricate themselves from the ruins, were severely burned before the flames were subdued. The total number of persons who suffered death or pain through the miserable incapacity of some builder or pretended architect is nearly one hundred. As may well be believed, the scene is said to have been terrible. Nothing, indeed, can be more appalling than such an instantaneous transformation of a ball-room, light, warm and perfumed, crowded with happy young people and echoing with music, into a yawning pit filled with splinters and rubbish, among which a few pale wretches are seen feebly struggling, while the sighs of the dying are stifled by the crackling of the increasing flames. It is unfortunate that those responsible for such catastrophes cannot always be present at them, to learn the terrible lesson which the sad sight would enforce, but this seems never to be possible, and the only alternative is to constitute public justice the guardian of the innocent, by holding the criminally negligent to strict accountability.

TWO Inspectors of the New York Building Bureau, in their search after unsafe structures, recently examined one of the largest public school-houses in the city, and found it in a dangerous condition. The partition-walls in the cellar were ruinous, and seventeen floor beams in one story were found badly decayed. Steps are to be taken at once to have the building put in proper order, and it is to be hoped that similar examinations will be made of the other school-houses of the town, with a like result where repairs are shown to be necessary. The safety, wholesomeness, and convenience of such edifices should be made the subject of frequent and rigid inspection. Not only are their occupants necessarily ignorant or thoughtless of matters which would attract the notice of older persons at once, but their childish carelessness adds much to the dangers which surround them; and nothing but constant care can prevent occasional serious occurrences. The best of our school-houses are not too good for their purpose, while the worst are a disgrace to a civilized nation; but even in these there are degrees of infamy, depending generally on circumstances within easy control of intelligent supervisors.

In order to ascertain the conditions under which the wires conveying the current of electric-lights are liable to communicate fire to neighboring combustible substances, the Brush Electric-Light Company in Philadelphia, has carried out an interesting series of experiments with uncovered wires. As might be supposed, the principal danger to be feared is the formation of a voltaic arc, with its intense heat, between two wires passing near each other. By trial it was shown that such arcs could not be established between two wires held firmly, even at a small distance apart, but that if jarred or shaken into momentary contact an arc was instantly formed, which persisted after their separation, and quickly set fire to any woodwork within the influence of its heat. Another source of danger was shown in the grounding of either wire. On setting a Brush lamp, with one wire grounded, upon a wet board floor, the water was soon seen to bubble, and the boards then began to smoke, finally taking fire. The formation of an arc between the two ends of a broken wire was next illustrated, and some singular effects observed. On cutting the wire and separating the broken ends, the electric arc was at once formed, the current continuing to pass until the wires had been moved so far apart that the electric force was no longer sufficient to throw it across the space. Just at the instant that the voltaic arc ceased to pass, it was observed that a sheet of flame shot out from the wires, capable of setting fire to bodies several inches away. A different test showed the existence of a danger hitherto hardly suspected, in the influence of a moisture in destroying the insulation of conductors. The outward and return wires of an electric circuit, insulated by a cotton covering in the usual way, were fastened to a board in parallel lines an inch apart. So long as the board remained dry, no effect was observed from the powerful currents, but on moistening the board between the wires with a little water, the wood was soon seen to steam, and finally to burn with smoke and flame.

An international exhibition of fine art is announced to be held in Vienna next year, under the auspices of the Viennese Society of Artists, opening April 1, and closing September 30; and painters, architects, sculptors, and engravers of all countries are invited to contribute works, and to compete for the prizes to be offered. The Government presents medals of various values, the Arch-Duke Charles Louis adds three more, and the Reichel prize will also be awarded to the most successful artist. Besides this, the management will buy a certain number of pictures, to be disposed of by lottery, and it is hoped that the Imperial Government will appropriate money for the purchase of works which obtain special distinction. No picture or sculpture will be admitted which has not been produced since the Exposition of 1873, and sales will be negotiated at a commission of five or six per cent. The juries will be chosen from among the members of the Committee and the exhibiting artists, and all works accepted by the Committee will be transported free to and from the exhibition, and insured until sold or returned. Architectural drawings must be mounted and framed, and it is requested that they may be at a small scale. Paintings must be framed, and water-color drawings and engravings glazed; and no oval, circular, or chamfered frame will be admitted unless mounted on a rectangular board. Works in stained glass are invited on the same footing as paintings, and in sculpture is included die-sinking, medal-engraving, and any other work in intaglio or relief, modelling in *unbaked* clay alone excepted. Among the members of the Committee are Hans Makart, Unger, Hasenauer, Von Angeli, Zumbusch, and other artists of note; the architect, Von Wielemans, is the Secretary, and Count Zichy is the President. Goods intended for the exhibition must be delivered at the Künstlerhaus in Vienna before 6 p. m. on March 1. Carriage must be prepaid on all articles, but the cost will be refunded to those whose contributions are admitted. Reasonable charges, only, however, will be allowed, and on objects sent by mail or "*grande vitesse*," only the ordinary freight tariff will be repaid. Communications and contributions must be addressed "An die Commission für die Internationale Kunstausstellung, Künstlerhaus, Lothringer-Strasse, Vienna."

The Disston speculation in Florida lands has begun to attract renewed attention. Mr. Disston himself, no doubt wisely, has arranged to part with a very large portion of his great domain, and the stock of an improvement company, carrying with it rights to small portions of the territory, is advertised in a way to attract small investors. Still another tract, said to contain two million acres, has been sold to a foreign syndicate, and will probably be divided into small lots and put upon the market in Europe. We cannot help regretting a little that Mr. Disston and his friends had not retained possession of their purchase until the great works of drainage and improvement about which so much was said some months ago could have been fully carried out. The Okeechobee canals are, it is true, being pushed as rapidly as possible, and there seems to be no reason why the anticipations of the projectors of the scheme should not be realized, and the country rapidly reclaimed and settled; but the history of Southern and Western land speculation is so unsavory, that the slightest appearance of a desire on the part of so recent a proprietor to "unload" upon the market, and particularly upon the market of small and inexperienced capitalists, suggests unpleasant thoughts.

We find in *La Semaine des Constructeurs* some interesting information in regard to the Siemens electrical railway which was lately in operation at Paris, and is now set up for exhibition in England. Under the Siemens system three rails constituted the track, of which the middle served to conduct the electric force to the engine or car, while the others were used for conveying the return current; the connection between the two taking place through the wheels and the machinery connected with them, and the extent of the electric circuit diminishing or increasing as the car approached or departed from the station where the generator was established. In Berlin, Brussels, and other places, where the apparatus was first exhibited, the track was isolated, and the rails out of the way of the public, but in Paris it was necessary to lay the road at the ground level, in a spot frequented by multitudes of people, so that there was serious danger that some one might walk across it while the current was passing, and happening to put one foot on the return rail, and the other on that in the middle, might direct the current through his own body, injuring him seriously, as well as stopping the movement of any cars which were travelling further up the track. To avoid this danger the middle rail was omitted, and its place as conductor of the upward current was supplied by a strong telegraph wire suspended overhead, and kept in communication with the car travelling below by means of a little runner, towed, so to speak, by the car; but it was found impossible to keep it from falling off, and at the same time the mud carried upon the rails by the passing vehicles prevented close contact between them and the wheels of the car, often interrupting the current altogether and stopping the machinery. These difficulties were finally obviated by arranging overhead conductors for both the upward and the return currents, consisting, not of wires, but of brass tubes, suspended at a convenient height above the track, and split on the under side through their whole length. In the tubes moved cylinders of brass, connected with the car below by rods which moved in the continuous open seam on the underside. By this means uninterrupted contact could be maintained, without danger of interference from passing persons or vehicles, and the railway was operated with complete success.

All former pupils of the École des Beaux-Arts will follow with interest the policy of the new Minister of Fine Art, whose energy is making itself felt in every department of artistic education in France. For the future administration of the École des Beaux-Arts M. Proust has in view no less an innovation than the suppression of the school ateliers, with the whole corps of professors, and the abolition of all restrictions upon the freedom of students to choose the master to whom inclination leads them, and the cessation of official interference between master and pupils. In other respects the course of the school instruction will remain the same. The "*concours*," or competitions, which form the most prominent characteristic of the French system, will be continued, but the competitors, instead of being all trained, as now, under the recognized professors, in a certain academic or traditional manner of design, will represent all styles of work, the bad, probably, as well as the good. What the effect of this unrestrained liberty will be, it is too early to predict, but every one will watch the event with interest.

BUILDING SUPERINTENDENCE. — XIII.[1]

At present this ideal is far from being fully realized in any form of apparatus. The nearest approach to it is perhaps the ordinary wash-bowl well fitted up, supplied through half-inch basin-cocks, and drained through 1¼-inch pipe, with a 1¼-inch S-trap, ventilated by a pipe of equal calibre carried to a main air-pipe. In such an apparatus there is no cavity to collect foulness; the supply is sufficiently copious to wash the sides of the basin by the force of its flow, and the calibre of the waste-pipe, including the trap, being uniform, the impetus of the discharge through it is nowhere checked, so that the friction of the swiftly passing water scours away the slime which tends to collect upon the inner surface of the pipes. Next to the wash-basin comes the pantry-sink, or "dish-washer," which is hardly more than a large basin lined with tinned copper instead of porcelain, and drained through the same size of pipe and ventilated S-trap.

Ventilation of Traps.

The ventilation of these traps, as well as of all similar ones, whether used under bowls, sinks, baths, water-closets or other apparatus, although absolutely essential to their security as a seal, is not yet so universally demanded by architects, or practised by plumbers, as it should be. Many and varied experiments with glass and other traps have conclusively shown that the effect of the discharge of a volume of water through those of the ordinary form, even when ventilated, is not, as apparently it would be, to leave a residue of liquid in the bend, standing at the level of the bottom of the outlet-pipe (Fig. 135) but is rather, by the impetus given to the whole moving mass, to throw a considerable portion of the residuary water beyond the bend, a portion running off through the outlet into the drain, while the remainder sinks back into the trap, partially filling it. (Fig. 136.)

Siphonage.

When the trap is unventilated it very frequently happens that the column of water passing through it, and over the outer bend, sets up a siphon-like action, the rising portion of the bend forming the short leg and the discharge-pipe the long leg of the siphon. When this happens, all the water in the trap is drawn over after the main stream, leaving it empty (Fig. 137), and of course destroying its efficacy as a check to the ascent of foul air. Another kind of siphon action is produced in the same traps whenever a considerable quantity of water is thrown down any waste connected with the drainage system. The main waste being filled, or nearly so, by the charge, is partially exhausted of air by the passage of the water through it, and unless the deficiency is supplied through ventilation-pipes the external atmosphere will force its way in through the traps, pushing the sealing-water before it, and leaving them open. To guard against the splashing of water over the bend, it is now common to make the trap very deep; and siphonage of all kinds is prevented by ventilation-pipes attached to every trap at the outlet bend, and carried to some main air-pipe. It was once usual to make these ventilation-pipes of small calibre, but experience has shown that air passes so slowly through small tubes that nothing less than 1½ inches is now used in good work.

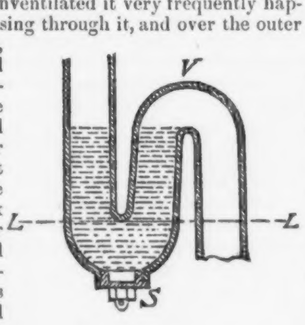


Fig. 135.


Fig. 136.


Fig. 137.

Kitchen Sinks.

If nothing but clear water passed through house-traps, the science of plumbing would be an easy matter, but it is not so; and with the kitchen sink serious difficulties begin to appear. The supply, by means of two "bibb-cocks" for hot and cold water respectively, is simple enough, but the waste liquid from the kitchen invariably contains more or less fatty matter, generally in a melted state, and suspended in small globules in the water, which during its passage through the cold pipes is chilled, and the floating particles striking the metal walls are congealed, covering them with a tallow-like coating which gradually thickens from accretions of similar matter until the pipe or siphon trap is nearly or wholly choked. The coating is very hard, so that no flushing, however vigorous, can do more than hasten the passage of the liquid and remove the inevitable congelation to a point farther down the pipe, and the only way to avoid certain ultimate stoppage at some point is to provide a reservoir or catch-basin on the line of discharge, which may retain the waste waters long enough to allow the grease to congeal and separate, and shall at the same time be large enough to contain a certain accumulation of solid matter without obstructing the water-way, and in a position where it can be readily reached and removed upon occasion. Years ago this was done by placing at some distance beyond the trap of the sink, either in the cellar or out of doors, a "grease-trap," consisting of a small tight brick cesspool, into which the waste-pipe from the sink emptied, while a second pipe, inserted in the wall of the grease-trap with its mouth turned downward (Fig. 138), so as to prevent the entrance of floating cakes of fat, carried the overflow to the drain. This form of trap would often hold the accumulated grease of many months, but offensive decomposition was apt to appear in the accompanying liquid, and it is generally preferable to discard in such a situation both the S-trap and the little cesspool, substituting a device which combines the advantages of both in the shape of a "round trap," shown in section in Figure 139, and provided with a large brass trap-screw at the top, which can be opened whenever necessary and

Grease-Traps.

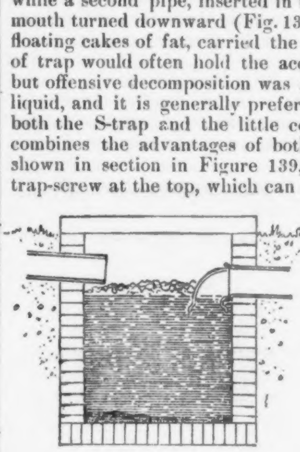


Fig. 138.

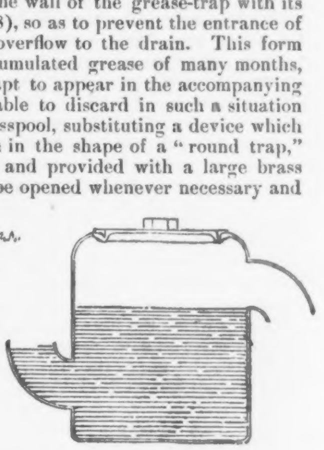


Fig. 139.

the fatty coating removed in a few moments. The round traps commonly used for sinks are of lead, six inches in diameter, with a 4-inch brass trap-screw inserted in the top. Until nearly filled with grease they are not easily siphoned out, and for this reason it is not customary to provide them with air-pipes, but the advantages of ventilation are now so fully recognized that no exception should be made in their favor.

Wash-Trays.

Wash-trays are usually drained through a round trap of the same size and construction in order to prevent any possible stoppage of the pipes by soap, which will in time form a greasy coating upon them. One trap is enough for a set of three or four trays.

For the kitchen sinks themselves no perfect material has yet been introduced. Small ones are made of white earthenware, which is all that could be desired, but specimens up to 24″ × 48″, the average size for good houses, are hardly yet attempted, and soapstone forms perhaps the best substitute. Earthenware wash-trays are however already in use, and though they are more expensive than soapstone the forty or fifty dollars of extra cost is more than repaid by their beauty and cleanliness. Iron sinks are much used and are made either plain, galvanized, or enamelled; the galvanized being, perhaps, the most durable finish.

Bath-Tubs.

Bath-tubs can be had of earthenware, but at considerable additional expense, the ordinary material being tinned and planished copper of suitable thickness. Fourteen ounces to the square foot is the weight which will generally be used unless the specifications direct otherwise, but copper of this thickness will soon "cockle" and become uneven from the expansion caused by hot water flowing over it, and sixteen-ounce metal is the lightest which is suitable for a first-rate job. Some architects require eighteen-ounce copper, which gives excellent results. The best manufacturers of baths stamp the weight of metal on each, so that there is no difficulty in discovering whether the contract has been complied with in this respect.

Every bath should have its own ventilated S-trap, separate from all other fixtures. The old custom of running bath or basin wastes into water-closet traps is obsolete among good plumbers. The supply may be brought through plain bibb-cocks (Fig. 140), bath-bibbs (Fig. 141), or by means of various forms of combination-cocks or concealed valves. It is quite common to arrange the cocks for hot and cold water behind the end of the tub, operating them by means of small handles above the capping. Inside the bath is a single small mouth-piece through which the hot and cold streams issue, mixed, at the temperature desired.

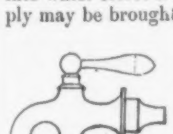


Fig. 140.

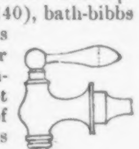


Fig. 141.

The supply may be placed close to the bottom of the tub, so that it fills noiselessly, but in this case, unless the ordinary pressure is very considerable, a check-valve should be put in the cold water supply or the opening of a cold-water cock in a basin or sink on a story below may, if the main supply should happen to be cut off, draw water from the bath.

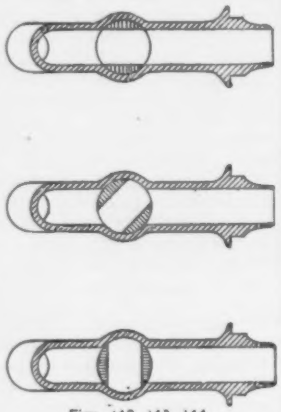
Ground-Cocks.

For sinks, wash-trays, basins, baths, slop-hoppers and similar apparatus, the supply of water is drawn from the pipes by means of cocks varying much in form and shape, and still more in construction. As a rule, the particular variety to be employed is mentioned in the specification, but there are some architects, and many more builders, who are content to regard the whole science of plumbing as a mystery beyond their comprehension, and either pass over such details in silence, or specify the cheapest varieties without regard to the conditions under which they are to be used.

All the forms of cocks, however varied in appearance and use, belong to one or the other of two great divisions, the "ground" or the "compression" cocks. The ground-cocks operate by means of

[1] It is perhaps unnecessary to say that the reason the door-truss, Fig. 121, was printed upside down in the number for November was because the printer found it necessary to rearrange the page after all proof reading by the editors had been finished, and put the cut back hap-hazard.

a plug, which is inserted into the bore of the pipe and is itself pierced with a hole of nearly similar size, so that when the plug is turned in such a way as to bring the hole into the axis of the bore of the pipe, the water runs freely through it; but by turning it at an angle with its previous direction the solid part of the plug is brought across the water-way and the flow cut off, either partially or wholly, according to the length of the arc through which it is turned. Figures 140 and 141 show two common forms of ground-cocks, and Figures 142, 143, and 144 explain the action of the pierced plug, Figure 140 showing a horizontal section of the cock when fully open, Figure 143 when partially closed, and Figure 144 when wholly closed. Of course the efficiency of such a cock, which is exactly the same in principle as the key of an ordinary gas-fixture, depends upon the accuracy with which the plug is ground into its seat; and to provide for tightening it after the surfaces have become abraded by the friction of use, it is customary to taper the plug and to insert a set-screw in the bottom, acting upon a strong spring interposed between it and the main body of the faucet, so that a turn of this will draw the plug down further into its seat.



Figs. 142, 143, 144.

This answers very well with clean water, but many public and private wells, reservoirs, pumps or other sources of supply deliver water containing small particles of sand, which are drawn into the faucets and get between the plug and its seat, where they soon cut small grooves which allow water to pass around the plug at all times, and the faucet drips persistently, notwithstanding the tightening of the set-screw. Such a leak cannot be remedied, except by putting in a new faucet, which involves a considerable expense. This difficulty is obviated by employing the compression or screw-down cocks, through which the water flows in a devious course, passing at one point through a strong metallic diaphragm, pierced with an opening of the requisite size, but capable of being closed by the application of a piston, armed with a leather or rubber washer, which is brought down upon it by a screw operated by a cross-handle from the outside. There are many varieties, some employing a lever instead of a screw, and closing with the flow of water instead of against it, but the principle is the same in all: the current being controlled wholly by the movement of the soft washer, the grains of sand which may be present can do no worse than lie on the top of the diaphragm, and indent themselves in the leather as it descends upon them, without affecting the metallic portions of the cock in the least; and when the washer is worn away, as it will be in course of time, a fresh one can be inserted by any person in a few minutes.

Compression-Cocks.

The only common form of apparatus which remains to be described is the water-closet, of which many varieties are used. The worst of these in principle is the ordinary pan-closet (Fig. 145), in which a pan, so arranged with valves and cistern or other supply as to be kept full of water when at rest, is held up by a counter-balance weight against the lower orifice of a stoneware basin. The pan, counter-balance and other working parts are enclosed in an iron "container," or "pot," above which the basin is set, while itself discharges through a lead S-trap into the main soil-pipe. Upon occasion the pan is tilted by pulling the handle beside the seat, as shown by the dotted lines, and throws its contents into the "pot," whence they find their way into the trap, and thence to the drain. The dashing of the soil and water against the rough inner surface of the cast-iron container soon smears it with filth, which decomposes, evolving much foul vapor, and although the water-seal of the trap below prevents the gases of the sewer from rising through the closet, the same barrier serves to hold within the container the effluvium which proceeds from the matter adhering to its walls till the unclosing of the mouth of the basin above by the raising of the handle, and consequent tilting of the pan, allows it to escape upward, which it does in a nauseating whiff, familiar to everyone. Besides this avenue of occasional exit a smaller one is always open, through the journal in which the pivot works which serves to tilt the pan. This might be made gas-tight, but in practice never is, and after the putty which is put around it on first setting is broken away by the movement of the pivot, a continual leakage of effluvium takes place. Various devices have been employed to lessen this annoyance: the best closets of the kind, in places where they are not yet superseded by very different apparatus, have the containers enamelled with smooth white porcelain, which is more easily washed by the flushing water; and others are fitted with ventilating tubes, to give a safe outlet to the air of the container; but the amelioration of the evil is only partial, and good plumbing work now admits no form of water-closet which gives any lodgment for filth, or opportunity for the generation of gas on the house side of the trap, this, if ventilated as it should be, forming an effectual barrier against the return of any kind of vapor.

Water-Closet.

Pan-Closet.

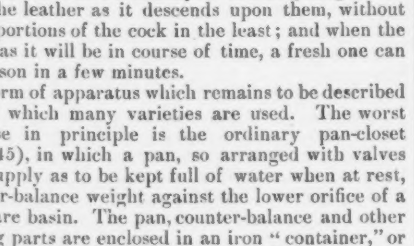


Fig. 145.

One variety of improved closet which is now popular, and if well made is very good, substitutes for the bulky pan under the bowl a small valve, which fits tightly against the mouth of the bowl, and holds the water in at the height determined by an overflow until the lifting of the handle drops it, and allows the contents of the bowl to escape into the trap. As in the case of the pan-closet, a receiver must be arranged under the bowl, to give room for the movements of the valve, but this is very small compared with the container of the pan-closet, so that it is well washed by the passage of the large body of water discharged from the bowl, and its surface being enamelled, little or nothing remains in it to decompose. Nevertheless, it is necessary for a first-class job to ventilate even this small receiver by a separate air-pipe. If this is done, not only is the vapor rising from a possible contamination of its walls prevented from issuing into the house on the opening of the valve, but that from the water of the trap below is withdrawn safely. It is now usual, in closets of this kind, to make the bowl with a "flushing-rim," or pierced pipe formed in the earthenware itself around the upper edge. The flushing water enters this and is carried entirely around the rim, descending on all sides and washing every portion of the bowl.

Flushing-rim Closets.

This flushing-rim is an essential requisite of a good closet. Without it the best patterns fail to give perfect satisfaction, and with it a very simple closet can be kept thoroughly clean. In fact, the practice of the best architects is gradually inclining to the use under all circumstances of a closet consisting merely of a well-made stoneware bowl or "hopper," with either a stoneware trap made in one piece with it or a separate lead trap, as circumstances may decide, and furnished with a flushing-rim, without valves, pan, or moving parts of any kind. The supply is so arranged as to deliver a considerable quantity of water with a sudden rush all around the rim, and the effect is not only to wash the bowl thoroughly at each discharge, but to urge the contents of the trap forward with such force as to insure their passage into the soil-pipe, leaving only clean water to form a seal. Without the sudden and copious downward supply, filth is sure to be left floating in the water of the trap, exposed to sight and smell, so that hoppers should only be used where this can be insured.

Hoppers.

A fourth variety of closet should be mentioned. This is the plunger-closet, of which the earliest form was the Jennings patent (Fig. 146), consisting in an earthenware bowl with side outlet and trap beneath in one piece with the bowl. The water is retained in the bowl by a plunger, as shown in the figure, fitting against a rubber seating. When the plunger is lifted by means of the handle, the contents of the bowl flow out beneath it, into and over the trap. The overflow in the original Jennings closet was arranged to take place through the plunger, which was made hollow for the purpose, but effluvium from matters which might be floating in the trap passed readily up through the same avenue, and escaped into the room around the handle by which the plunger was moved.

Plunger-Closets.

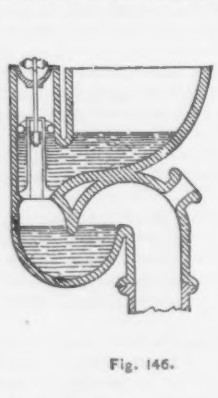


Fig. 146.

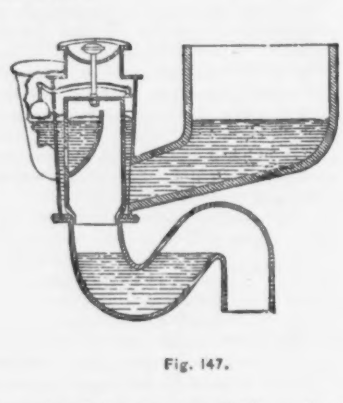


Fig. 147.

The supply was delivered through a delicate valve, which required to be adjusted to the pressure for each closet, and where this was variable, often allowed water at times to run to waste through the closet and the overflow. Both these defects have been remedied in various ways. In the Demarest pattern (Fig. 147), a small cistern is attached to the bowl, communicating with it, and a ball-cock in this affords a reliable means of shutting off the supply when the basin is full. The overflow takes place through the plunger, which is considerably larger than in the Jennings apparatus, but is trapped in its passage.

All the closets of this description, as indeed of any other, require careful use, to prevent filth from lodging upon or about the plunger, where it decomposes, sending up faint odors around the handle. If this should happen, the cup can be unscrewed and the plunger lifted out and cleaned in a few minutes, but even this trouble is to be avoided if possible.

Connections.

The main point to be observed in setting them is the security of the connections. The old-fashioned bowls have earthenware "horns" to receive the supply, and the only joint possible between these and the lead pipe is made with a mass of putty, tied with a rag; but all modern apparatus has brass ferrules or couplings baked into the earthenware horn, and a permanent soldered joint is easily made. In the same way, the connection between the outlet of the container, hopper, or trap, as the case may be, whether of iron or stoneware, and the lead pipe or trap beyond is still usually made by "flanging" the end of the lead pipe out on the floor, inserting the projecting mouth of the closet, screwing it down, through the lead, to the floor, and daubing the whole with putty; but the very best apparatus is now provided with brass ferrules at the outlet as well as at the inlet, securing a perfect joint. Where putty is necessarily used about plumbing work, it should be mixed with red lead, to prevent rats from eating it, or it will soon disappear.

At the end of this Part will be found a plumber's specification, which will serve to call attention to certain points which need not here be mentioned.

The plumber's work continues, simultaneously with the other building operations, nearly until the completion of the house, so that in point of time the description of a considerable portion of it belongs with work mentioned hereafter, but it is more convenient to gather together in one place whatever needs to be said upon the subject, and one more matter remains to be explained before we dismiss it entirely from our minds.

Peppermint Test.

After the contract is completed, and the connections made between the bath-boiler and the water-front of the range or cooking-stove, the water should be turned into *all* the pipes, in order that imperfect joints, or the holes frequently caused by the careless driving of nails, may be detected and remedied. At some subsequent time, when the traps have been filled by use, the tightness of the drain-pipes should be tested with oil of peppermint. The oil is sold expressly for the purpose, in two-ounce vials, hermetically sealed by melting the glass together over the mouth. A man is sent up to the roof with the vial of oil, and after stopping up temporarily all ventilation or air pipes connected with any part of the drainage system, he breaks off the top of the vial, and pours the contents down into the soil-pipe, which will as a matter of course in any modern house project above the roof. A pitcher of hot water is immediately handed up to him, and he pours this down after the peppermint, and closes the mouth of the soil-pipe by stuffing in paper or rags. The peppermint is volatilized by the heat of the water, and the vapor, unable to escape, penetrates by diffusion every part of the system. Meanwhile, another man examines all the drain, soil, and waste pipes in the house, and if the operation has been properly conducted, the slightest odor of peppermint in the building will be conclusive evidence of some defect, either in a joint or pipe, which must be at once remedied. It is important that the man who carries and applies the peppermint should not be allowed to enter the house, as he is sure to carry with him some trace of the powerful scent, which will make the test useless. After the trial is over, the pipes above the roof may be unclosed, and if no leak has been detected, the plumbing can be pronounced safe. Plumbers often profess to apply this test, but do so in a manner which makes the result unreliable. Unless the apertures of vent and soil pipes are closed, a circulation is very apt to exist between the upper portion of the soil-pipe and the nearest air-pipe, which will, especially if no water is used to help the diffusion of the oil, carry off the fragrant vapor before it can penetrate into the comparatively stagnant atmosphere which fills the lower portions of the system.

The fumes of burning sulphur are sometimes substituted for the peppermint vapor, but the application is more troublesome, and the result no more satisfactory.

Furnace.

At or before this stage in the construction the furnace should be put in, and the cellar floor concreted. If left, as is often the case, till a later period, when the kiln-dried finishings or floors are in place, these are very apt to absorb dampness from the mass of wet cement in the basement, and lose their shape or their glossy surface.

We have to deal with a client who insists upon an ample supply of fresh air at all seasons, and have therefore advised him to select a furnace possessing as large a radiating surface as possible, in order to secure the delivery into his rooms in cold weather of an abundant supply of moderately warmed air; and in accordance with this intention we have provided for large hot-air pipes and registers everywhere. That this will involve greater expense, both in the original cost of the apparatus and in consumption of fuel, than would be necessary for obtaining the same amount of warmth by means of a smaller volume of hotter air from a furnace with less radiating surface, we have frankly told him, but he is wise enough to think that true economy lies in sacrificing something for the sake of the health and good spirits which only fresh air can give.

He is, indeed, so bent upon securing a perfectly pure atmosphere in his house in winter as to be quite alarmed when we propose to him the purchase of a cast-iron apparatus, and reads to us extracts from the circulars of various manufacturers of wrought-iron furnaces, which, as he says, "prove" that carbonic acid, carbonic oxide, and other deleterious gases "pass freely through the pores of cast-iron," and escape into the house. We assure him that this danger is greatly exaggerated, if not entirely imaginary; while the large radiating surface, which is absolutely essential to the effect which he desires, can be had only in one or two costly forms of wrought-iron furnace, most of these consisting simply of a short cylinder of sheet metal, inverted over the fire-pot, and presenting a very limited, but very hot surface to the air flowing past it. As air can only be warmed by *actual contact* with a heated body, such a furnace, if set in a large casing, with ample supply of air, instead of warming the whole to a moderate degree would heat a small portion intensely, leaving the remainder as cold as ever, and the registers would either deliver into the rooms alternate puffs of very hot and very cold air, or certain rooms only could be heated, at the expense of the others.

Small Radiating Surface.

To be operated successfully, this sort of apparatus must be fitted with a *small* air-chamber, and small pipes and registers. The casing of the air-chamber is then heated by radiation from the dome of the furnace, close by, and the small volume of air which passes between the two surfaces is thoroughly and strongly warmed, acquiring thereby a powerful ascensive force, which throws it easily in any required direction through pipes of appropriate size, and heats the rooms above, not by introducing a full volume of warm air, but by means of a small current of very hot air; which mixes with that already in the apartment, so as to raise the whole to the required temperature.

Large Radiating Surface.

To obtain an abundant supply of moderately warm air, it is essential, as furnaces are now constructed, to provide a large air-chamber, and distribute the smoke-tubes and other radiating surfaces in it in such a way that the air cannot pass through without striking one or more of them. The air issuing from such a furnace will all be warm, instead of partly cold and partly hot, as it would be without this division of the heating surface; and the quantity being greater, a much lower temperature will suffice to produce the same effect in warming the rooms above.

Most cast-iron furnaces are designed with special reference to this end, which has been recognized as desirable ever since heating apparatus first came into use; and many of them secure it tolerably well. Unfortunately, the castings are sometimes defective, and the joints are subject in several forms to separate or break by the effect of expansion and contraction, with the result of allowing smoke and gas to escape and mingle with the fresh air in the pipes. We have, however, selected a pattern in which the castings appear on close examination smooth and sound, and the joints, while occurring at the most favorable points, are all put together with short sleeves, which allow of expansion and contraction without harm. Unlike most furnaces, which receive the air from the cold-air box a little above the level of the ash reservoir, ours is intended to stand over a pit dug in the cellar floor, into which the cold air is brought by an underground conduit, to circulate first beneath the pan of ashes before it ascends among the hotter surfaces above. Unless the ground below the cellar bottom is well drained, such subterranean conduits are liable to infiltrations of unwholesome moisture, and this point should be determined before the choice of apparatus is made. The air trunk is made of brick, with brick bottom, plastered with cement, and covered with flag-stones. The pit into which it opens is walled with brick; the same wall being extended upward if the furnace is to be "brick-set," or forming merely the foundation for the sheet-iron casing if the "portable" variety is used. A brick pier in the centre serves to support the heavy castings above. Into the further end of the brick trunk is cemented the cold-air box, of iron or wood, which brings air to the furnace from a window or other opening.

Capacity of Cold-Air Box.

The superintendent must see that the cold-air box is not made too small. The obvious rule for determining the proper size is that it should be capable of conveying into the furnace-chamber as much air as is to be drawn out by means of the registers; or, to put it in another way, that the capacity of the cold-air box should be equal to that of all the hot-air pipes which will ever be in use at one time, less one-sixth, which represents the gain in volume which the air acquires by expansion in passing through the furnace. In our present example, the registers in the parlor, dining-room, hall, and staircase-hall, are, for the sake of insuring an abundant ventilation, supplied through circular tin pipes, twelve inches in diameter. Two chambers in the second story have ten-inch pipes, two have eight-inch, and the bath-room has a six-inch supply. The aggregate sectional area of these will be, expressed in square feet, $(1^2 + 1^2 + 1^2 + 1^2 + (\frac{10}{12})^2 + (\frac{10}{12})^2 + (\frac{2}{3})^2 + (\frac{2}{3})^2 + (\frac{1}{2})^2 \times .7854 = 5.13$ square feet. Six-sevenths of 5.13 will be 4.39 square feet, and this will be the necessary minimum sectional area of the cold-air conduit to insure a supply of warm air at each of the nine registers, in case they are all open at once, as they should generally be. If the cold-air box is made smaller than this calculation would require, the flow of warm air at the registers will be feeble and uncertain, or "wiredrawn," or perhaps at some of them it may cease entirely, or even be reversed by the draught of the longer pipes, which, unable to obtain through the contracted cold-air box the quantity which they require, draw down through the registers nearest the furnace an additional supply.

Where so liberal a provision of fresh air is to be made, it is particularly necessary to see that the outer opening of the supply-conduit is not so situated as to be unfavorably acted upon by the wind. It is usual to place the opening toward the north or west, as the coldest winds come from those points, and while they blow the air is drawn through the furnace with greater rapidity than usual, and if fire enough is kept up, the supply of warm air at the registers is correspondingly increased. There is, however, under these circumstances, some danger that a high wind may drive the air through the conduit so rapidly that it cannot stay long enough to get warmed on the passage, and blows out from the registers in a chilly stream; and to guard against this a slide-damper is usually inserted, which can be partially closed to temper the force of the incoming blast; but if a change then takes place in the direction of the breeze, the furnace is left without its needful supply of air. Occasionally the single inlet proves to be the source of still worse troubles. If, while it remains open, a violent wind should spring up from the quarter opposite to that toward which it faces, the partial vacuum which always exists on the lee side of a building may become so decided as to cause air from within the house to flow toward it by the most direct channel, which will be downward through the registers, into the air-chamber of the furnace, and thence by means of the cold-air box to the outside. By this reversal of the ordinary course, not only are the rooms deprived of heat, but the air drawn from them at a comparatively high temperature becomes intensely hot in passing again over the radiating surfaces of the furnace, and may even, if the cold-air box is of wood, be the means of setting this on fire, and with it the house itself. This is a much more common accident than most persons imagine, and safety as well as comfort make it important to guard against the causes which may occasion it.

Air-Supply.

The simplest way of preventing reversed currents in the cold-air box is to give it *two* openings to the outer air, as nearly as possible opposite to each other; then, whatever may be the direction of the wind, the air cannot be drawn out of the furnace. It may, however, still blow through the registers, and a still better mode is to carry the cold-air box entirely across the building, at a little distance from the furnace, opening to the outside at each end, drawing from this the supply to the furnace by means of a short, but sufficiently capacious pipe, opening into the main conduit, at right angles to it. Then the wind may blow at will through the main trunk, without affecting the current in the short pipe, which will continue to draw at all times just the supply that the furnace needs, and no more.

Whether the cold-air box shall be made of wood or metal is a question to be decided according to the circumstances of each case. Galvanized iron has the great advantages of being impermeable, so that no cellar air can be mixed with the pure current from out of doors or its passage through the furnace and the pipes, and of being fire-proof, so that there will be no danger, however hard the wind may blow, of having the building set on fire by an unexpected back draught; but it is very expensive, and those who wish to secure its advantages must pay for them. On explaining the matter to our client, we find that even his enthusiasm for fresh air is a little damped at learning that a galvanized-iron air-box for his furnace would cost more than the furnace itself, and he takes the question under consideration for a few days; but an inspection of the wooden air-boxes in the houses of his friends shows them to be full of crevices, sometimes large enough to admit the hand, and in all cases quite capable of allowing an unlimited amount of cellar air and dust to be drawn into the furnace and discharged into the rooms above, so that he finally declares in favor of an impervious conduit at any cost.

Material of Cold-Air Box.

THE ILLUSTRATIONS.

COTTAGE FOR A. B. RICH, D. D., SHORT HILLS PARK, N. J. MESSRS. LAMB & RICH, ARCHITECTS, NEW YORK, N. Y.

A FEATURE of this house is a low arch off the stair-landing, through which the studio is seen. The stairs are of bamboo, while the hall is finished in rough-cast plaster. The second floor contains four chambers beside the studio. The exterior is to be stained deep yellow at peak of gable and grade into bronze green and then into deep indian-red at base. Below the first-story window-sills is weather-boarding. It is now half finished at a contract price of $3,500.

BRIDGEWATER MEMORIAL LIBRARY. MESSRS. ROTCH & TILDEN, ARCHITECTS, BOSTON, MASS.

The principal dimensions of the building are 54½' x 57½'. It is built of brick with finish of brownstone, quarry face where possible; dark slate roof with crestings and finials of terra-cotta; terra-cotta is also largely used in the front elevation; the underpinning is of red granite, quarry face. The interior finish is of ash. It is now nearly completed under a contract of $9,000 above the foundations.

HOUSE AT HARTFORD, CONN. MR. W. C. BROCKLESBY, ARCHITECT, HARTFORD, CONN.

CHURCH AT NEWTON, IO. MESSRS. BARTLETT & WEST, ARCHITECTS, DES MOINES, IO.

LEGAL NOTES AND CASES.

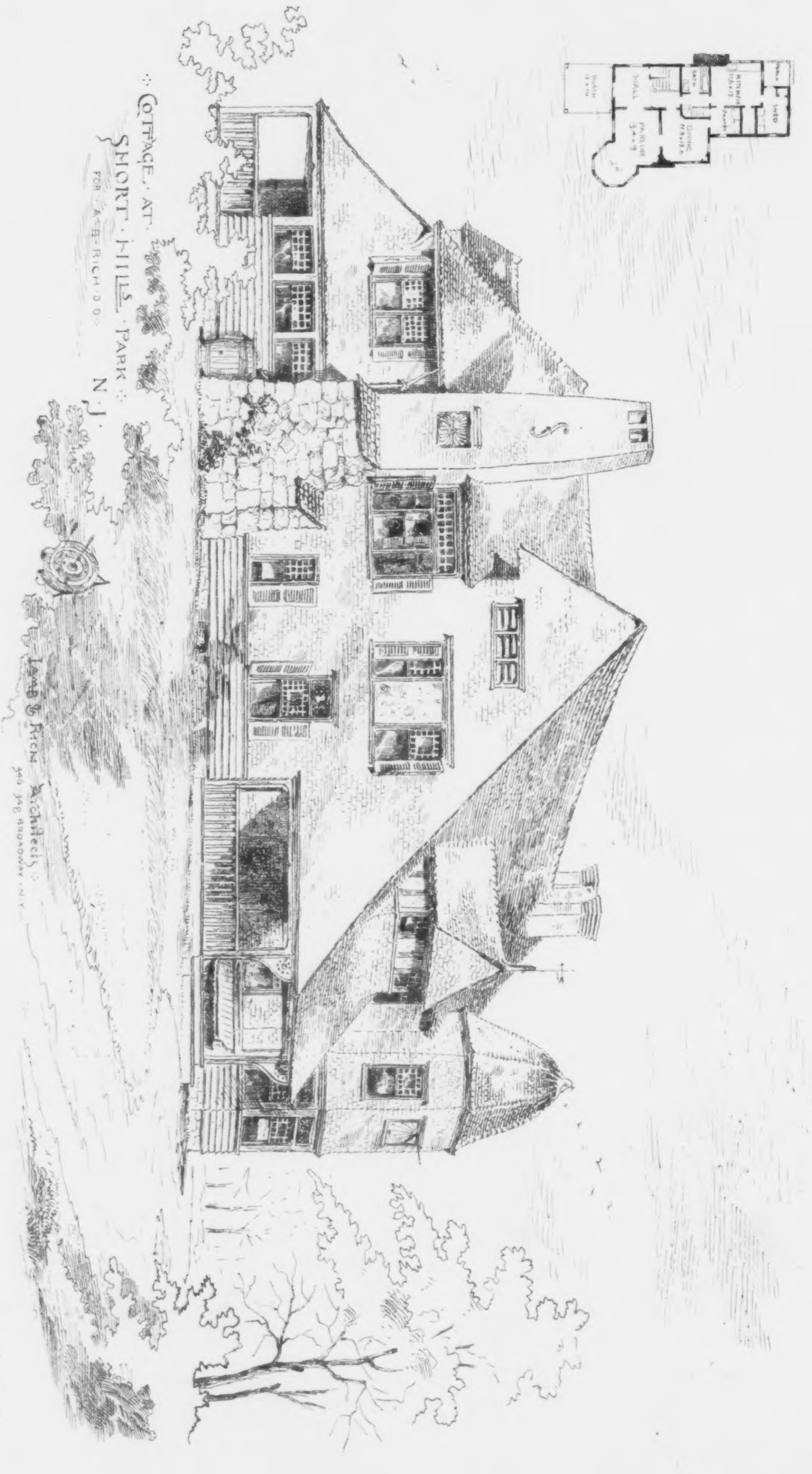
Architect.—Authority to bind Owner for Extra Work by Builder.

THE Supreme Court of Errors of Connecticut had under consideration in June, in *Starkweather vs. Goodman*, the question of the authority of a superintending architect to bind the owner of the building under construction for extra work done by the builder. S made a written contract to furnish all materials and do all the work necessary for the construction of a house for the defendant according to definite plans and specifications, and for a fixed sum. E, the architect who drew the plan, was by the contract made superintendent of construction, and all materials and work were to be accepted by him. E ordered S to make certain changes in, and additions to, the plan. It is not found that the defendant instructed E to make these changes, or that he had knowledge of them until completed. S made them and thus increased the cost and value of the house. When completed the defendant took and has since retained possession of it. The plaintiff, as assignee of S, brought this action for payment for the labor and materials thus ordered by E, and, having recovered judgment therefor in the City Court of Hartford, the defendant filed a motion for a new trial.

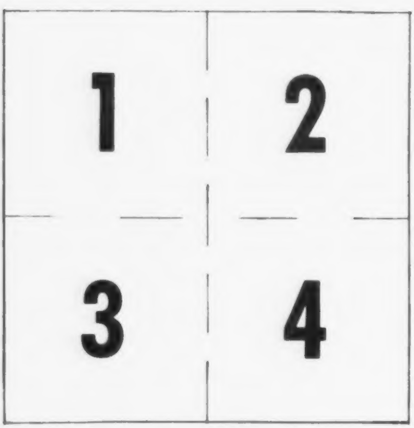
Pardee, J., in the opinion, said: The contract sets forth the extent of E's agency for the defendant; he is only to see that the materials and workmanship are in accordance with the specifications. There remained no opportunity to S to extend that power by inference, and when he furnished materials for, or performed labor upon, the house in excess of the specifications upon the order of E, he assumed the risk of ratification by the defendant. Nor is the defendant estopped from insisting upon this contract limitation upon E by the fact that when the house was nearly completed he received in silence a statement of work and materials not specified in the written contract, which included some which he had not ordered; for these had been wrought into the building and were then beyond possibility of withdrawal by S, however strongly the defendant might have protested against payment for them. It is very clear, therefore, that, as to these extras, S was not led into any action resulting in loss to him by the defendant's failing to make the objection. But it is said that other extras were afterwards ordered by E and furnished by S, and that, whatever might be the effect of the defendant's silence upon the extras already furnished, he ought to be regarded, by reason thereof, as authorizing the extras afterwards ordered. But it does not appear that S at that time suggested to him that there might be other extras ordered by E, or that the matter was thought of by either of them. Besides, the question whether the defendant intended to influence the future action of S, or was guilty of such gross negligence that he could be chargeable with that intention, and the further question whether S was influenced by his conduct, were both questions of fact and not of law, and it is impossible for us to find these facts when the court below has failed to do so. *Judgment reversed.* H. E.

Contract.—Liability of Subscriber to a Building Fund for his Subscription.

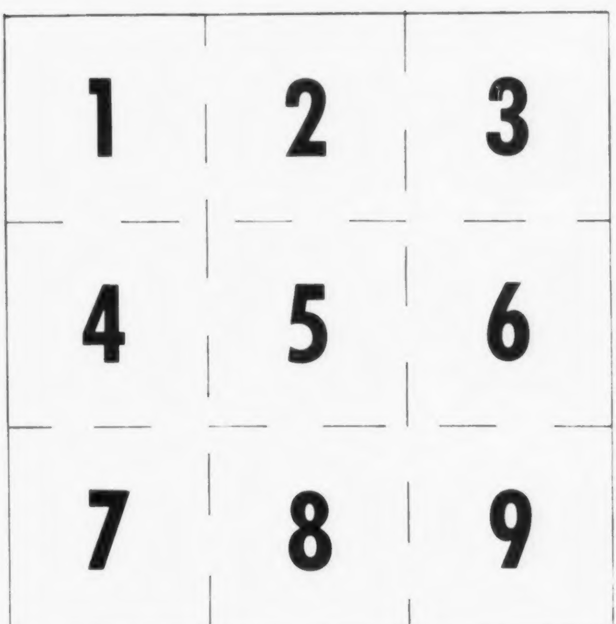
In *Carr vs. Bartlett*, the Supreme Court of Maine, in July, decided that the subscriber to a building fund was liable for the amount of his subscription to his associates after the payment of subscriptions, though before such payment he could have withdrawn from the undertaking. In this case the building committee of a cheese factory association sued the defendant for her subscription thereto. The factory was built within the limits specified in the agreement, which is set out in the opinion of the court. Peters, J.: The defendant, with others, signed an agreement of association containing the following clauses: "We, the undersigned, residents of the town of Montville and vicinity, hereby agree to enter into association for the purpose of erecting and operating a cheese factory, . . . and we severally and individually bind ourselves, by these presents, on or before the first day of May, 1874, to pay our regularly appointed building committee the several sums set opposite our names for the purpose of building and furnishing said factory. . . . The above not to be binding unless the sum of $2,000 is subscribed." This undertaking, while it remained inchoate and incomplete, was not binding upon the defendant. It was without consideration. It was not a sufficient consideration that others joined in the same promise, relying upon her promise. *Foxcroft Academy vs. Favor*, 4 Maine, 382; *Cottage Street M. E. Church vs. Kendall*, 121 Mass., 528. The latter case is the subject of an instructive note, citing and discussing a mass of authorities, in American Law Register, September No., 1877. At this stage of the undertaking the defendant could have withdrawn from it, or she could continue a party until the same became a completed agreement and binding upon her. She took the latter course. The subscription became completed. Her associates paid in their subscriptions, made purchases, and entered into contracts necessary for the consummation of the common enterprise. She is presumed to have assented to all that was done. Those facts furnished a sufficient consideration for the liability which by her subscription she assumed. The authorities are agreed upon this point, as the cases cited and those to be cited clearly show. It is denied that the plaintiffs are competent parties to sue for the subscription. They are the regularly appointed building committee of the subscribers. They are themselves subscribers. In their name, for the benefit of the associates, they contracted for the erection of the factory. Under the agreement they are the payees or promisees by description, in whose names the subscriptions are collectable for the benefit of all

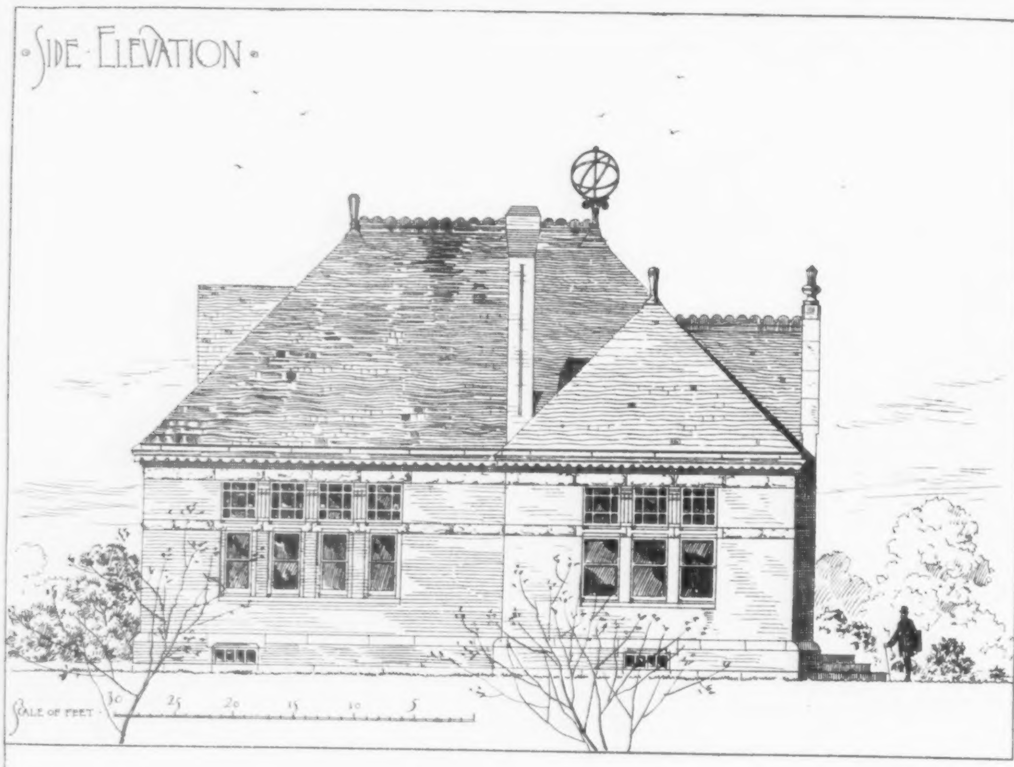

Cottage at Short Hills Park N.J.
For A. B. Rich D.D.
Lamb & Rich Architects
346 348 Broadway N.Y.

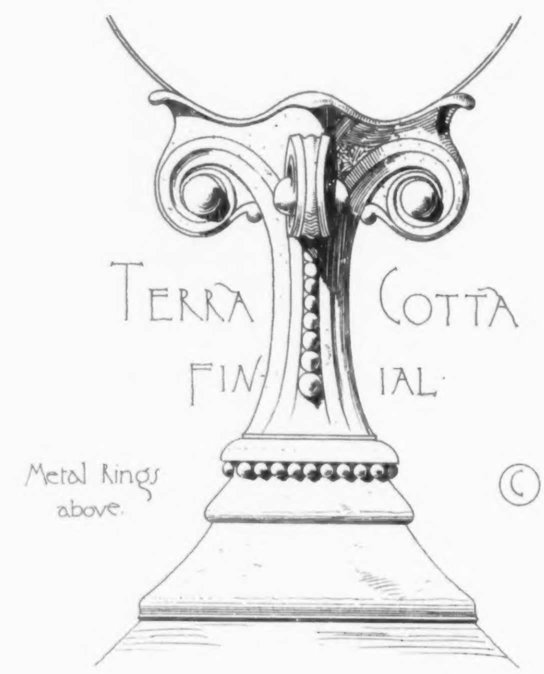
Maps on this order too large to be
are filmed clockwise beginning in th
right and top to bottom as many fra
diagrams illustrate the method.

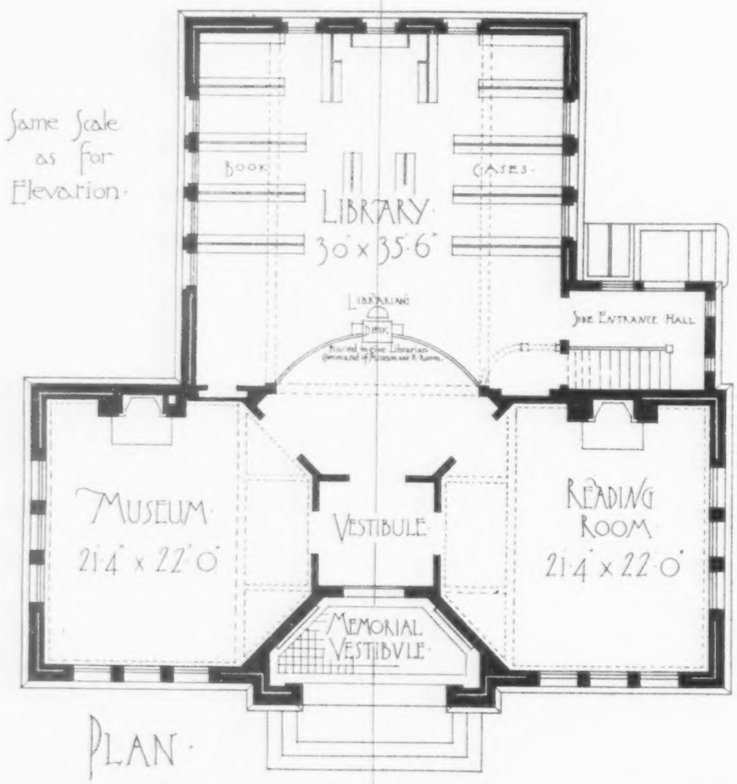


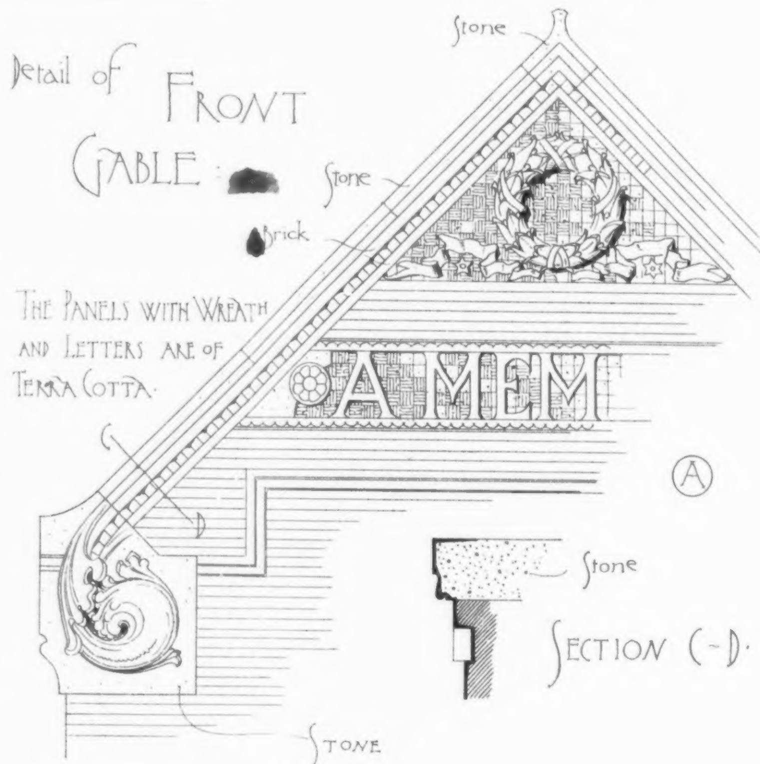
e entirely included in one exposure
the upper left hand corner, left to
frames as required. The following

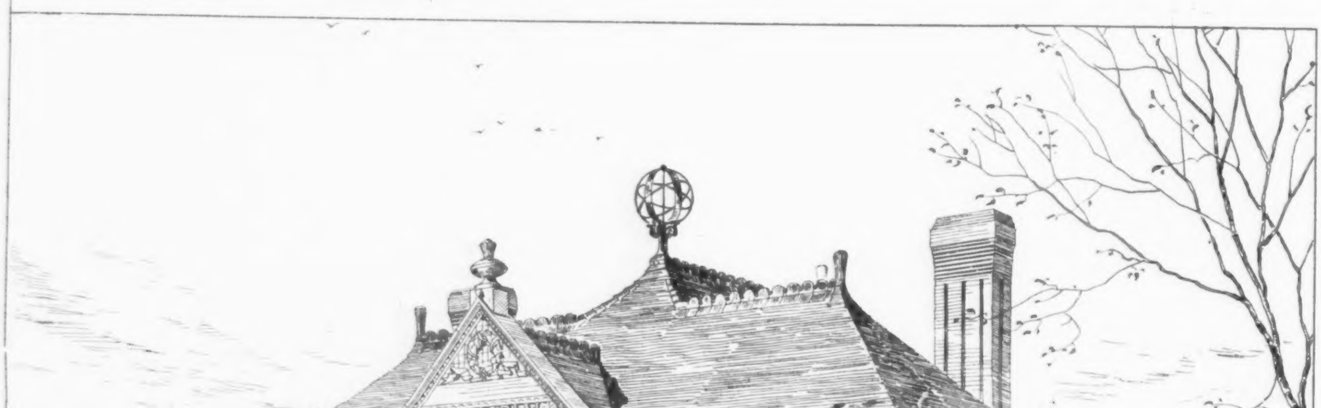


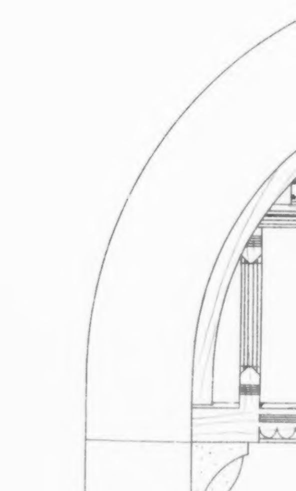

SIDE ELEVATION
SCALE OF FEET 30 25 20 15 10 5

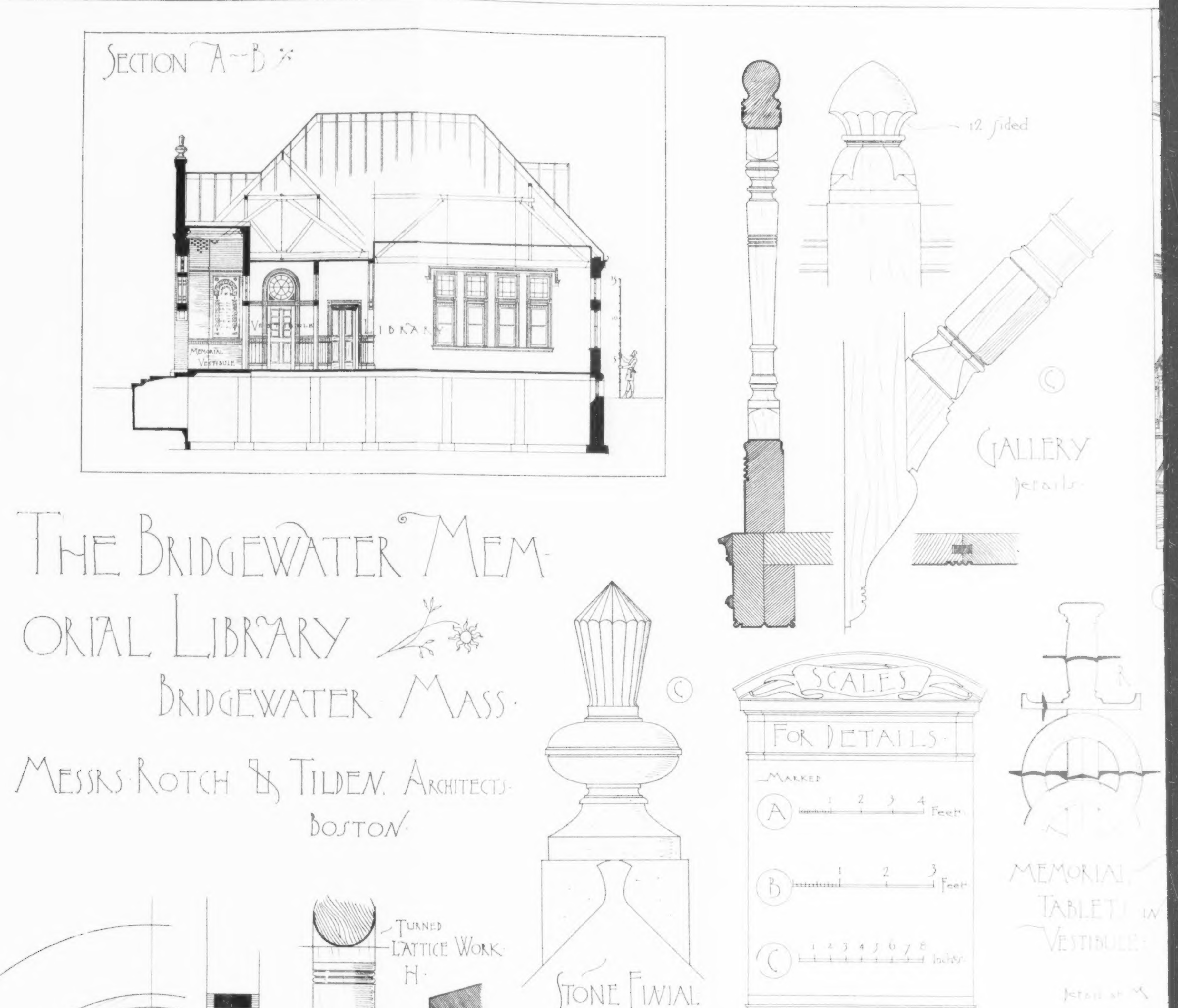

TERRA COTTA
FINIAL
Metal Rings above
C


Same Scale as for Elevation
BOOK CASES
LIBRARY 30' x 35' 6"
SIDE ENTRANCE HALL
MUSEUM 21' 4" x 22' 0"
VESTIBULE
READING ROOM 21' 4" x 22' 0"
MEMORIAL VESTIBULE
PLAN

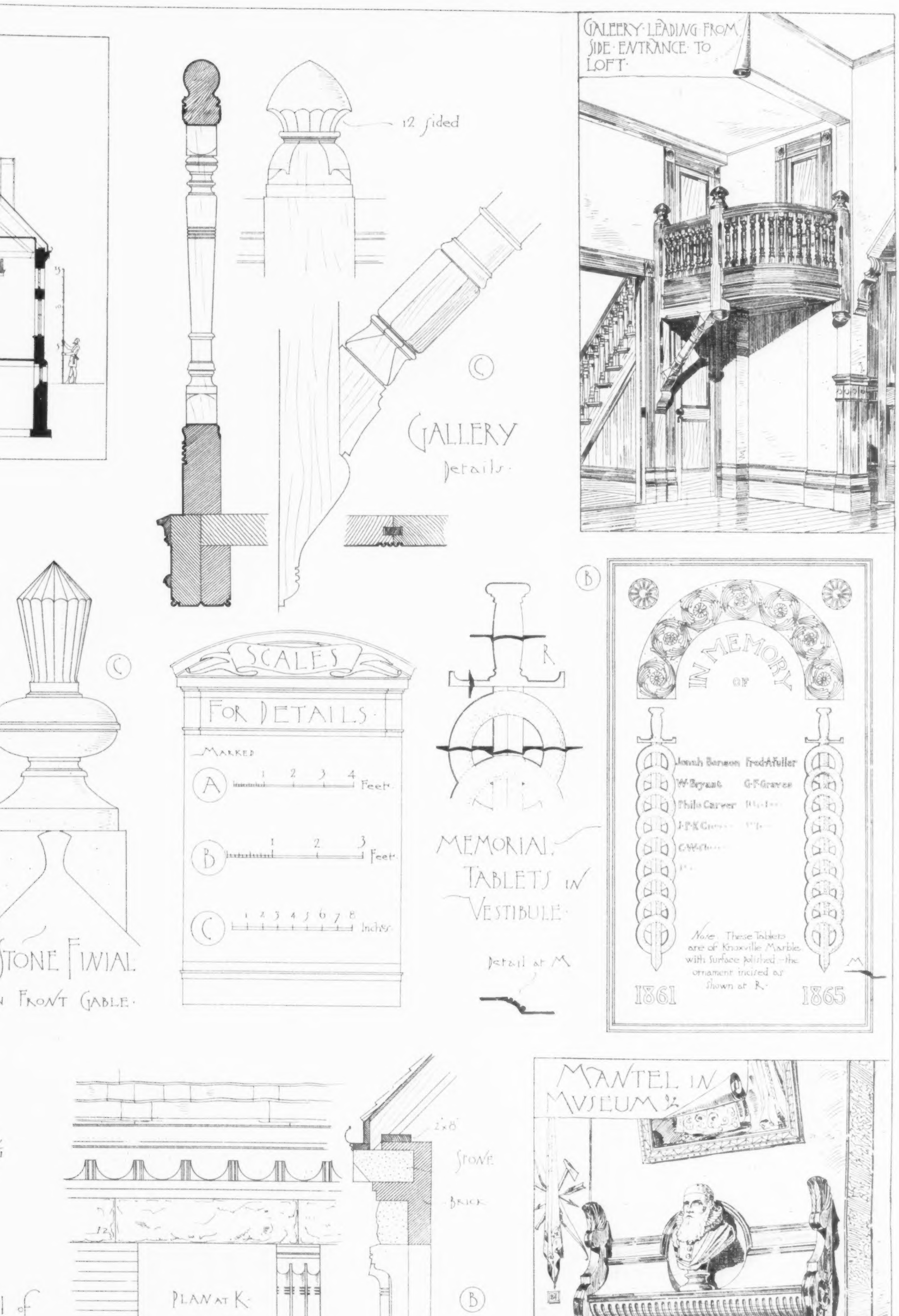

Detail of FRONT GABLE
Stone
Stone
Brick
THE PANELS WITH WREATH AND LETTERS ARE OF TERRA COTTA
A MEM
A
Stone
SECTION C-D
STONE


PERSPECTIVE VIEW

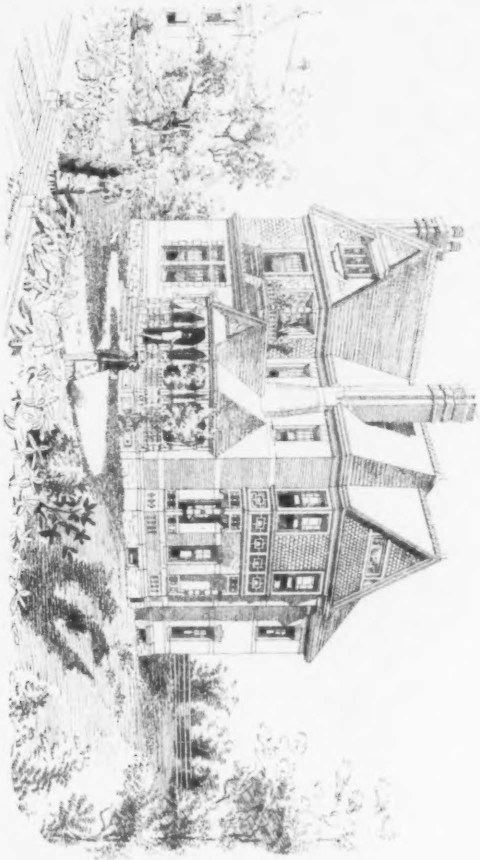


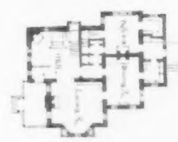

SECTION A—B
MEMORIAL VESTIBULE
LIBRARY
12 sided
GALLERY Details
THE BRIDGEWATER MEMORIAL LIBRARY
BRIDGEWATER MASS.
MESSRS ROTCH & TILDEN, ARCHITECTS.
BOSTON
SCALES
FOR DETAILS
MARKED
A 1 2 3 4 Feet
B 1 2 3 Feet
C 1 2 3 4 5 6 7 8 Inches
MEMORIAL TABLETS IN VESTIBULE
STONE FINIAL ON FRONT GABLE
TURNED LATTICE WORK H
AT F
TRANSOM MOULDING G
H
F
E
G
A
Detail of GATE
STANDARDS E.
Details of FRONT ENTRANCE
PLAN AT K
K
Stone Sill
TERRA COTTA
B
A FRONT WINDOW OPENING


Terra Cotta Finial.
Metal Rings above
C
Section A–B
Vestibule
Library
Memorial Vestibule
The Bridgewater Memorial Library
Bridgewater Mass.
Messrs. Rotch & Tilden, Architects.
Boston.
Detail of Front Gable
Stone
Bricks
The Panels with Wreath and Letters are of Terra Cotta
A MEM
A
Section C–D.
Stone
Turned Lattice Work H.
At F
Transom Moulding G.
H
F
E
G
A
Standards E.
Details of Front Entrance.
Detail of Gate
Perspective View.

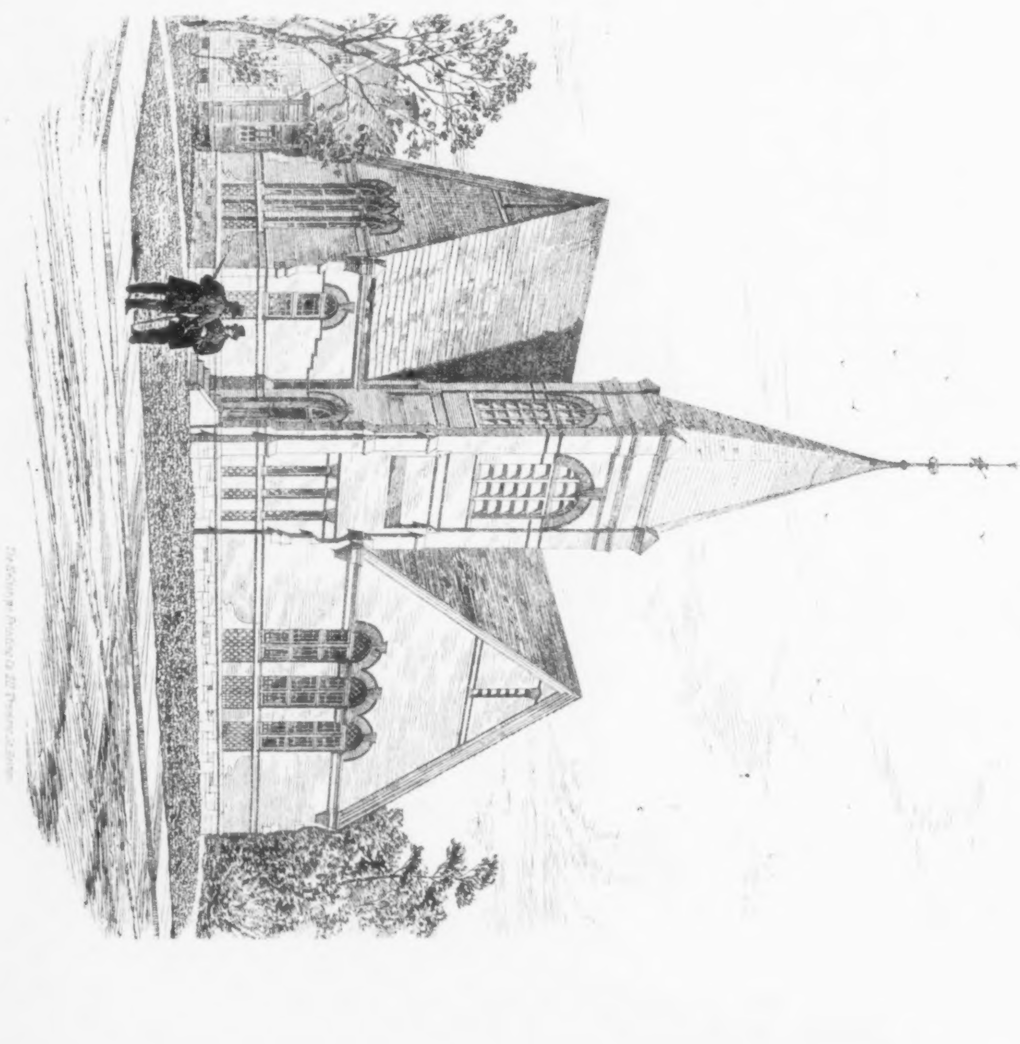


12 sided
C
GALLERY
Details
GALLERY LEADING FROM SIDE ENTRANCE TO LOFT
C
STONE FINIAL
N FRONT GABLE
SCALES
FOR DETAILS
MARKED
A 1 2 3 4 Feet
B 1 2 3 Feet
C 1 2 3 4 5 6 7 8 Inches
R
MEMORIAL TABLETS IN VESTIBULE
Detail at M
B
IN MEMORY OF
Jonah Benson Fred A Fuller
W Bryant G F Graves
Philo Carver
Note: These Tablets are of Knoxville Marble with Surface polished — the ornament incised as shown at R.
1861
1865
M
2x8
Stone
Brick
PLAN AT K
K
B
Stone Sill
TERRA COTTA
A FRONT WINDOW OPENING
MANTEL IN MUSEUM





Residence at Hartford, Conn.
W. C. Brocklesby, Architect.



Methodist E. Church, Newton, Iowa. Messrs. Benj. J. Bartlett & Albert A. Wert, Des Moines, Ia. Architects.

concerned. They are the association by representation. Therefore the objection is avoided that sometimes is presented in this class of contracts, that the mutual promises of subscribers do not afford a consideration for a contract with a third person, for a want of privity between the subscribers and such person. *Thompson vs. Page*, 1 Met., 565; *Ives vs. Sterling*, 6 Ib., 310; *Fisher vs. Ellis*, 3 Pick., 323; *Watkins vs. Eames*, 9 Cush., 537; *Athol Music Hall vs. Carey*, 116 Mass., 471; *Curry vs. Rogers*, 21 N. H., 247. There can be no valid objection to a suit in the name of the plaintiffs for the benefit of themselves and associates. *Judgment for plaintiffs.* H. E.

Landlord and Tenant. — Rent. — Use and Occupation.

When premises have been occupied by the landlord's permission, and there was not a distinct understanding that no rent should be paid, the law implies a promise to pay a reasonable rent for the premises. *Cobb vs. Kidd*, United States Circuit Court, S. D. of New York, September, 1881. H. E.

Continuing Guaranty. — Closing Contract. — Notice.

A guarantor under a continuing guaranty must have an early notice of the closing out of the transactions under the contract from the guarantee, or he will not be liable for any debt due by the principal. *Singer Manufacturing Company vs. Littler.* Supreme Court of Iowa, October, 1881. H. E.

Lien of Attorney at Law on Funds of Client.—Associate Counsel.

An attorney at law has a lien on the funds of his client for the fees of his associate counsel as well as for his own services. *Jackson vs. Clopton*, Supreme Court of Alabama, June, 1881. H. E.

Mortgages. — For Future Advances. — Judgments.

A mortgage was executed to secure the mortgagee for indorsements made or to be made for the mortgagor, or his firm, and it was duly recorded. Subsequent indorsements were made, but before some of them were executed, judgments had been recovered and entered against the mortgagor, and on the foreclosure and sale of the mortgaged premises the judgment creditors claimed priority over the mortgagee as to these subsequent indorsements. The court decided in favor of the mortgagee, and said: Mortgages to secure future advances are valid, and the judgments are not entitled to any preference over the mortgage as to indorsements made after the judgments were docketed; the record of such mortgage is notice to subsequent purchasers and incumbrancers, and puts them on inquiry. *Acherman vs. Hansicker*, New York Court of Appeals, April 19, 1881. H. E.

QUICKSAND IN EXCAVATION.[1]

THE various text-books are silent in regard to the economic management of this, one of the most troublesome materials that an engineer is called upon to deal with. Those who have encountered it would have been greatly aided by the experience, now only contained in private note-books or the recollections of the profession.

With this in view, the writer offers to the Society some memoranda and a description of the methods used several years since, in the excavation and removal of a large body of quicksand, prefacing that two energetic and experienced contractors successively failed in their attempts by the ordinary methods used for removing earth excavation. As these failures had given the place a bad name among contractors, and no one was found willing, except at excessive prices, to undertake the work, the writer, then in charge, urged and obtained from the State authorities of New York the power to conduct it personally. Omitting mention of minor difficulties only the principal ones will be here considered.

A mass of quicksand occurred in a cutting on the State works of New York, of about thirteen hundred feet in length, and averaging about thirty feet in depth, amounting in the aggregate to one hundred thousand cubic yards — although a portion of the cutting was what is known as cemented clay and gravel (sometimes called hard-pan), occurring in layers or strata at different elevations, the remainder being ordinary earth excavation. About forty thousand cubic yards had been removed by the contractor, or was other than quicksand, leaving sixty thousand cubic yards of the latter material. No change of location was admissible. The contractors' methods had been to work off as much material as possible at the ends and top of the cutting, using heavy plows, especially constructed, requiring in some cases eight to ten horses in order to break it up for the shovel. Some attention had also been paid to drainage. A breast and falls had been attempted at one end, in the usual manner for ordinary earth, but the material remained quicksand, despite some attempts to reduce it to a less expensive condition. It was no infrequent occurrence to see laborers, animals, contractor and engineers stuck fast in the mud together — some of them extracted with no little difficulty — and a visitor to this section always brought away with him distinguishing marks of his trip. When the execution of the work passed into the hands of the engineer, the key-note was considered to be a most thorough and complete system of drainage, as nearly all of the difficulties met with were directly traceable to the excessive amount of water which this peculiar material is capable of retaining, and drawing to itself through capillary attraction or other natural laws, and which it very reluctantly parts with.

Although its name conveys the idea of a mass of sand surcharged with water until it becomes "quick," or susceptible of easy movement or agitation, suggesting actual life, yet engineers know only too well that this is not the most troublesome member of the family. The one that causes the most trouble, and is here treated of, is an argillaceous material containing no silex or grit, comminutes completely, and is usually leaden in color in its natural state, and nearly white when thoroughly deprived of water. So free is it from sand that it can be used with good effect in polishing or cleaning silver and the softer metals. The work was therefore commenced by driving a cutting into the middle of the quicksand and at right angles to the canal prism, with a grade below canal bottom, and amply below the level necessary for good and rapid drainage. The comparative magnitude of this drainage cutting, amounting to nine thousand cubic yards, to be made at their own cost, had deterred the contractors from attempting it. To this main drain other large ones were conducted, over the surface of the cutting intended for the prism. The top width of the prism cutting was about one hundred and fifty feet. Connecting with these large drains were innumerable smaller ones, made to reach all parts of the surface of the quicksand. Such drainage as could be effected from each end of the cutting was also availed of. The construction and maintenance of these ditches in first-rate effective order was in reality the key to the success of the plan, but with continued practice it was remarkable how efficient the workmen became in this troublesome part of the work. By an occasional judicious use of the plow or scraper, but mainly, however, with spades and shovels, providing planks for the men to stand on while at work, and the selection of intelligent workmen, the cost and time required were soon much reduced. As far as possible, all travelling over the surface while being thus ditched was prevented, as it agitated the material, and caused it to retain the water more obstinately.

After a night's quiet rest, and the great withdrawal of water through the ditches, the surface was in good condition for excavating and the material, in the words of the workmen, would then "shovel like ashes." As far as possible, plank roads were laid for the carts, and by frequently shifting from one place to another, the parts to be worked were given sufficient time to drain, and they had also been given the undisturbed *rest* which this material requires.

Care should always be had to withdraw the men and teams at once from any place which indicates that it is again becoming "quick," from the disturbing effect of repeated travelling over its surface. Nothing is gained by working longer, when this important question of rest is involved. It is better to stop work for the day, if no other use for the force can be provided. A certain period of rest is as essential as the drainage itself. The contractor alluded to claimed justly that his morning hours were the most profitable.

A lump of this quicksand, apparently dry, may very often be made "quick" by a little agitation alone. Hard and apparently dry lumps will often become wet and pasty on their way to the dumping ground, so much so as to require additional labor to remove them from the carts. The benefits of drainage, therefore, do not end until the material is *finally* disposed of. It is useless to attempt excavation and hauling in wet weather, and a little time even is required after a storm, for the drains to reduce it to proper working conditions. A close observance of the color is a very good guide as to the times for excavating it to the best advantage.

When at its best for easy and continuous shoveling, both in the case in point, and as observed elsewhere, its color was of a very light grayish tint. When becoming disturbed by the agitation of continued travel and working it gradually deepened in color — and this became so well understood, that an ordinary workman was aware when it was prudent to change to another locality, and leave it to its required rest. In its natural state in place, and before being disturbed by the workmen or drainage operations, the quicksand at a few inches below its surface was compact, and offered considerable resistance to the penetration of spades or other working tools, and had a putty-like consistence. It was free from sand or grit, and constituted the true engineers' quicksand, so-called, or mis-called where no sand enters into its composition.

The first discouraging weeks at the ditch-work were much improved upon by the remarkable increase in skill, and faithfulness, and efficiency of the men selected for this important part of the plan.[2] The strong flow of water through the main ditch, with its collections from the minor ones, and through the ditches from each end of the cutting, indicated the success of the drainage operations.

The cost of excavating the quicksand at this place (exclusive of the expense of hauling beyond a moderate distance), under the circumstances related, was about nineteen cents per cubic yard, but to this must be added three and one-half cents for the cost of the

[1] Read before the American Society of Civil Engineers, May 18, 1881, by Mr. Charles L. McAlpine, Member of the Society.

[2] One of the most discouraging and troublesome features in the method detailed is the apathy and indifference of the ordinary workman employed in keeping the ditches open and in good effective condition for drainage. The ditching is disagreeable, dirty and uncomfortable work, and there is a constant disposition to shirk it. The ditches are constantly filling up, sloughing in from the sides and swelling up from the bottom, and the water keeps the material in a sticky, pasty condition, exceedingly troublesome to handle or to remove from the shovel. The foreman often sympathizes and listens to the complaints of the men, and the usual "practical-man" argument comes to the front. The immediate consequences of neglecting the minor ditches has little apparent force with the "practical" man. Moral suasion, deepening occasionally into some severity, and much personal supervision will probably always be necessary to success. In the case in point I was probably fortunate in the selection of the men for this work, and as stated, a few weeks showed a vast improvement in their efficiency; but it is well not to be discouraged when the very best efforts fail in accomplishing all that the manager is striving for.

great drain or cutting mentioned, and about four and one-half cents for the labor of constructing and keeping the sub-ditches and small drains throughout the cutting in good and effective condition. This may be compared with the price at which an energetic contractor, by the common method, could *not* do the work at forty cents per cubic yard. The saving in cost to the State was about eight thousand dollars, by the adoption of the plan which has been detailed in this paper, besides a saving of one-half in the time required to execute the work. Portions of the quicksand excavation were so successfully treated, that at the present rates of labor they would not have cost above fourteen cents per cubic yard. And it should be stated that if the operations here detailed had been in use from the first, so as to include the whole body of the quicksand, the rate per cubic yard here given would have been considerably reduced.

The difference may be contrasted in time, cost and comfort, between excavating quicksand in its original condition when in place, by the ordinary methods in use for other materials, with that to which it is reduced by thorough drainage and careful management; or the difference between a man shoveling five or six cubic yards per day or about twenty in the same time.

This material which may have given so much trouble, first, to place it into the carts, next to haul it over its quaking surface, then to remove it from the carts, will, when finally disposed of on the embankment and exposed to the drying influences of complete drainage and sunshine, become so comminuted as to be carried off in clouds by the wind. In this state it is at the other extreme, and would be too dry for convenient shoveling.

In the opinion of the writer, hardly any case of quicksand excavation of any considerable amount could occur where it would not be profitable to first remove the water, even where natural drainage cannot be resorted to. The cost of pumping machinery of the power needed, worked either by hand, horse or steam, would soon pay for itself and work a magical change in the material. Even when the cost of machinery appears to add heavily to the expense of removal, yet the time saved, the comfort in doing the work, the saving in wear and tear, the greater ease in obtaining workmen, will be found profitable and far more satisfactory in all results.

On several of the works on which the writer was engaged, where the contractors paid but little attention to thorough drainage, the earth on each side settled to an extraordinary extent, laterally into the cuttings, for great distances on each side, occasioned by the slipping and flowing of substrata of quicksand in a semi-fluid state, weighted, as it was, by heavy superincumbent masses, so that several times the amount originally contained within the prism-lines had to be excavated and removed.

On one of our trunk lines of railway the grade was raised three times before the track could be laid, and the settlement of the surface on each side had then produced considerable damage to adjacent property.

It is well known that when most of the water is removed from quicksand it will bear quite a steep slope, as compared to the same material surcharged with water.

In these remarks the endeavor is made to separate the costs, expenses and method of excavating quicksand from that of other materials.

No small difficulty was occasioned, in the execution of the work, by encountering layers and strata of cemented or indurated clay and gravel, which interfered greatly with the plans for removing the quicksand. These strata were not of sufficient thickness to make blasting profitable, offering much opposition to drilling, the pebbles being hard and apt to turn so as to continually present new surfaces to the drill, and they could not be passed until pulverization was to some extent or even completely effected. The continued blows of a pick were slow in their effect, and the same was true of the heaviest hammer that a strong man could wield, or crows that two men could lift. I think power drills and a light, easily portable piling machine could have been used with good effect, drilling a line of holes a little distance back from the edge to produce a favorable line of fracture, and subjecting the portion so cut off to heavier blows than could be effected by hand, first removing a portion of the supporting material from underneath this hard material. The cost of removing the cemented clay and gravel ran sometimes as high as one dollar and eleven cents per cubic yard.

Some other local questions such as long haulage, etc., have been eliminated as only embarrassing the subject under consideration.

The price of labor at the time was one and a half dollars per day for laborers, and four dollars for two carts and a driver.

A quicksand case, bearing an affinity to the subject here treated of, was under grave consideration by the Canal Board, of the State of New York some years ago, and similar questions have arisen a number of times since. It is desirable that the practice and decision of engineers should be rendered uniform, and the most effective method seems to be to place it before the Society for its consideration and action.

A heavy cutting on the State works of New York was composed of clay, sand, gravel, indurated clay and gravel, boulders and quicksand, the greater portion of which was of the latter material. The excavations were made by teams and rail-cars. Ditches,— made and maintained at the contractor's cost, — were used to a considerable extent. Some of the layers of quicksand, lying at greater elevations, were more easily drained than the lower portions, and when this was effected its excavation and removal was comparatively easy.

The question in dispute was, whether it should, after drainage, be any longer considered as quicksand and paid for by the State as such, at a greater price than for common earth. The length of the cutting was about one thousand yards, and the deepest cutting seventy-six feet. The excavations were made from each end and at the centre. The upper layer was well drained; the next below less so, but yet to a considerable extent; and the lower layer was much improved by ditching. The upper layer was excavated at no greater cost than the adjacent clay; the second layer, less thoroughly drained, retained its character of quicksand and cost more to excavate, and when placed in the cars it became a quivering and sticky mass before arriving at the dumping ground. The contractors received no payment for draining the section, and all drainage by ditches or otherwise was at their own cost. They had three classifications for earth excavation, namely, cemented clay and gravel, quicksand, "and all other excavation." The question mentioned was so gravely entertained that it was considered necessary to obtain the opinions of several engineers, whose practice enabled them to express an opinion on the subject. One stated that the real question was, "what was the material before a portion of it, namely, the water, was removed? If quicksand at the time of commencing the work, the payment of the quicksand price cannot be avoided."

Another said, "assuming the material to have been quicksand when the work was commenced, no methods adopted by the contractors at their own cost, by which it was more easily excavated than was anticipated, can affect his claim to the price for quicksand. Such claim on his part is, therefore, consistent with justice as it is with usage."

Another thought that the contractor should not suffer for the results of his own sagacity, and that the cost of drainage should be considered in the same light as that for pumps or engines used for the same purpose.

Another engineer said, that much depended upon the explanations given by the engineers in charge at the time the contract was let, and upon the uniform practice on the work upon which the case occurred, and that the opinion of an engineer should be taken with much caution and due allowance for the circumstances. The result was that the contractor, after several years, settled with the State, no quicksand price being allowed on the upper strata nor upon a portion of the strata next below.

It would seem to the writer, as it may to others, that no grave question of this kind should arise in regard to the classification of this material, and that it should matter but little to the State, Company, or others, who have contracted to have work done, in what manner it is performed (so that it is done in a workmanlike and reasonably speedy manner), and if those executing it choose to first separate its component parts and remove them separately at their own cost, the object being accomplished, there are no grounds for refusing payment.

Yet that there are now and have been such questions raised, one of the proofs is the case cited.

It has been said, that as the contractors worked the cutting from the two ends much of the water would, by its own gravity, separate itself from the upper layer of the material without trouble or expense to the contractors, and that he should not claim an advantage which was the result of natural laws.

The opposition made to the payment of the quicksand price, and the trial of the case by a responsible body like the Canal Board, accustomed to the consideration and trial of many cases relating to the execution of engineering works, as well as the diverse opinions of some of the profession, renders an engineer's decision a matter of grave importance not only to the contractor and the company, but to the engineer whose fiat so often decides the case, and has led to the foregoing statements and opinions, in the hope of eliciting such expressions of the views of the members, as may be of valuable aid in the decision of future cases, and the avoidance of injustice or costly disputes between companies and their contractors.

Engineers will no doubt call to mind their own experience with conscientious members of Boards of Directors, whose minds become troubled when they see this formidable material reduced to the simplest conditions for excavation, and that their contractor is removing it with comparative ease, and that it is then very hard at times for the engineer to retain the directors' confidence, that his classification at an increased price is proper and right.

It need hardly be mentioned that the expressed views of skilled engineers, such as it is hoped the discussions may bring out, would have great weight in the decision of these troublesome cases.

This paper has been entitled "Quicksand in Excavation," and it has been confined to the consideration of that branch of the general subject, namely, the proper management of this troublesome and uncertain material when it occurs in cuttings for railways, canals and other work not requiring the removal of much, if any, of it below the grade line.

But there are other descriptions of work where quicksand is encountered which may require much skill and care to safely provide for: as in the foundations of important and heavy structures; in pipe lines in cities; under massive buildings; under dams for retaining water, etc. Valuable data in regard to such cases are contained in the memoranda of most engineers, and if the interest felt in the subject by this Society is indicated, it would no doubt draw out much information covering wider ground than the writer has thought it best to occupy in a first paper on this subject.

The description of special cases, the nature of the difficulties and the methods of overcoming them, would be of great future use to the profession, more particularly as authors have greatly overlooked or omitted these important questions. Engineering text-books give much information about other materials likely to occur in construction work; but this, one of the most troublesome and costly, has been strangely neglected.

Possibly it will be of service in this discussion to consider the origin of quicksands, and the peculiarity of their physical qualities upon which their characteristics depend. It may be assumed generally that the special mobility of such sands depends upon the presence of water filling the interstices of the mass. The mass yields to pressure in conformity to the laws of liquids or semi-fluids, varying with the degree of quickness. The degree of quickness depends upon, *first*, the gravity of the sand; *second*, upon the smoothness of the surface of the particular grains of sand; and *third*, upon the abundance of the water present with it.

Sand is a product of the action of wind or water on fragments of stone, by which, through the grinding away of the rough surfaces of the grains, they become smooth and polished. If transported under proper conditions the grains are assorted and deposited according to size and weight, and so accumulate in large quantities, having grains with nearly uniform dimensions throughout the bed. Under some influences such beds may be percolated by currents of water saturated with lime or silica, which will be deposited on the grains of sand, roughening their surfaces, and when the process is long continued binding them into beds of sandstone. When water, free from such impurities, flows through the beds of sand they will continue as such, and when made from quartz, if the grains are very smooth surfaced, and water present, abundant enough to thoroughly fill the interstices, such sands will yield to pressure and be quicksands. In the absence of free water the friction of the grains of sand against each other will usually prevent the quickness. Obviously, the treatment will be to get rid of the water by ditching, sinking pipes and pumping it out, or cutting off its inflow.

The important question seems to be how to get water out of beds of quicksands, for when that is done, they will, in most cases, cease to be such, and will be tractable.

I venture to call attention to the possibility, in case of foundations, of injecting cement or cement-forming material into the bed of quicksand, or into seams of it when not easily controlled otherwise, converting it thus into sandstone by a quick method, very much as is done naturally by slow processes.

HOLLOW WALLS IN BUILDINGS.

A SALUBRIOUS and comfortable atmosphere in winter is best attained when houses are so constructed that they can be heated with the least possible amount of artificial heat.

I will premise that every building that is to be kept cool in summer and warm in winter should be provided with double windows. This is of the utmost importance. No building can be made thoroughly comfortable without these important appendages. The next great desideratum is to so construct walls as to prevent so far as possible the convection of heat through them. To this end it is essential that we use such material as has the least conducting power; hence the importance of our understanding the relative conductivity of the different materials used. Nearly all first-class buildings have their walls of stone, brick and mortar. The cheaper buildings, such as dwellings of a moderately expensive kind, are usually built of wood, and there is perhaps no class of buildings in which we live in the construction of which there is a necessity for so thorough a knowledge of how to build as in this class of houses.

The relative conducting power of the different building materials is as follows:—

Stone	14 to 16
Brick	5
Plaster	4
Wood, less than	1

Wood, therefore, is the best material named; but woollen felt is now much used in place of wood, and is probably better for many purposes.

Various considerations, however, may govern our choice and necessitate the use of stone or brick. When this is the case, it is an excellent method to fur the walls inside with ordinary furring strips, then sheathe or cover them with this woollen felt, and against the face of each furring, and over the felt, fur again for lath and plaster. This is an interposition of what we have shown to be a comparatively good non-conductor, and with an air-chamber on each side of it, between the brick and the wood on the one hand and the lath and plaster on the other, it is perhaps the best method of preventing convection of heat through walls. Hollow brick walls are sometimes resorted to, but if the two sections of the walls are so completely separated as to entirely break the continuity of the brick the walls are weakened. It is a popular error that a wide space or air-chamber in a hollow wall is better than a narrow one. This error is founded entirely on a misconception of what heat is, and how it travels through space.

For the purpose of making our demonstrations as clear as practicable, we will assume that the material of our building is chiefly wood, and that it is desirable to prevent the convection of heat as much as possible. For the illustration of a principle and without reference to stability of construction, we will suppose our wall to be made of a series of close board partitions set a little distance apart to produce chambers for "dead air." We shall endeavor to show that these chambers will be equally efficient as non-conductors whether they be one or ten inches in width, and for convenience of reference we will number the partitions separating these chambers one, two, three, etc.

A beam of rays from the sun is simply a collection of ethereal waves flying through space with a velocity that far outstrips the lightning, and so long as these waves are allowed to continue on in their journey uninterrupted, there is no more heat in them than in the icy regions at the poles, but when they impinge on our bodies, through the medium of our nerves and brain, they produce the sensation of heat. If they impinge on the retina of the eye, they produce the sensation of light.

Now, we will suppose that a beam of these rays, or ether waves, shall impinge on the exterior of our imaginary house, with its board walls and air-chambers. If it strikes the outside board, or partition number one, in a direction perpendicular to the plane of the board, a much greater portion of the beam will be absorbed and transmitted than if it impinge upon the board obliquely, but in either case a portion of the beam, depending on its angle of incidence, will be absorbed and transmitted in accordance with the laws of convection, and the remainder will be reflected back into space, or to the surrounding objects, in accordance with the laws of reflection.

When this beam has impinged upon the surface of this partition number one, that portion of the beam that is absorbed enters among the molecules of the wood, and sets them in active motion, one against another, and now, for the first time, our rays become heat. Before they impinge on the wood they are simply motion — a wave in the ether, similar to a wave on the surface of water, and these waves that are reflected off continue as motion, and are only changed into heat when they find a lodgement in some material substance.

We have now advanced to that point in our demonstration where we have our ethereal waves absorbed in the first surface of the first partition from which it is transmitted from molecule to molecule until the heat has found its way through to the second surface of board number one, and this transmission is technically called convection. At this second surface the heat is again changed into ethereal motion, and, again taking the form of a wave, it jumps across the intervening space to the first surface of the second partition. I have said that the distance across this air-space makes no sensible difference in regard to the transmission of heat, and for this reason, that it travels through its medium, the ether, at the rate of nearly 190,000 miles per second; hence, practically, the difference of a few inches, or feet even, is unimportant.

We take our beam where we left it at the first surface of the second partition, but we find only part of it, — for a considerable portion was reflected back from the first surface of the first partition and lost. It is, however, sufficient for our present purpose to know that it has not entered the building.

Our beam, or what is left of it, has been absorbed and again changed to molecular motion — that is to say heat, and another part of if reflected back to the first partition, where it is again reflected in part, and the remainder is absorbed, and transmitted by convection to the first surface of the first board, and sent back into space as ether waves. That portion which has been absorbed by partition number two will be transmitted through this partition by convection, as through the first partition, and so this process goes on from partition to partition, until, if there be enough of them, the whole beam will be turned back and dissipated, and no sensible amount of heat will get into the building.

If walls of brick, stone, iron, or other material are used that have a greater power for absorbing these waves and converting them into heat, a smaller portion of the waves will be reflected back each time, and a proportionately greater number of compartment partitions will be required.

It has been claimed that the wider air-chamber is preferable to the narrower one, for the reason that the ray of heat emerging from a given point diverges, and that its intensity at the next surface on which it falls is inversely as the square of the distance. We admit the correctness of this principle, but we should not overlook the fact that the entire second surface of our partition, instead of giving off heat-waves at a single point, is emitting them at every point on its surface, and each and all of these diverging rays are crossing and overlapping each other, so that in fact the same amount of heat that leaves the first reaches the second partition, diminished only by a small absorption of these rays by the vapor in the air-chamber, which is quite too small to be considered in the general result.

The advantages to be derived from a thorough understanding and a skilful application of these principles in the construction of compartment-walls by which to prevent the transmission of heat through them, is very great.

G. P. RANDALL, Architect.

PLASTER-WORK.

THE subject of decorative plastering has recently taxed the knowledge of architects, and details of the methods used by the old plasterers are eagerly sought after. It is, however, not a difficult matter. The methods of making "coarse stuff" and "fine stuff," "gauge stuff," the selenitic cement mortar, Keene's and Parian cements, rough-casting, and other processes are well known, and the modern plasterer can probably turn out as good plaster-work if he likes as the old plasterer in the days of the Stuarts. Under the modern contract-system, the plasterer has become a vastly different artificer to the workman who executed the panel and enriched ceilings of the Elizabethan and Stuart periods. He is now seldom an artist, though he can model any amount of enrichments of the stock patterns. The history of the trade is one intimately related with the progress of art in this country for the last three hundred years. Not to speak of the ancient Romans, who were noted for their mortar and plaster incrustations, the mediæval architects never had that distaste for plastering their interiors which some have imagined. Every one who has carefully examined any of the old monastic buildings and churches will have found abundant evidence to the contrary. A close examination of the walls will disclose fragments of plaster in either thin or thick coats, and the rubble walls of many of our ruined abbeys have pieces still adhering to the stone-work, often colored. One writer alludes to a thin layer of plaster at Little Braxted Church, Essex, a building of Transitional Norman character, on the rubble walls; and Mr. Buckler, in his "Churches of Essex," mentions some plastered brick windows. Many of the groined vaults of the old abbeys, as at Netley, were plastered, and the cathedral of Rochester shows plastering between the wooden ribs. We are tempted to mention examples of mediæval plastering, but we pass on to notice the parget-work of the sixteenth and following centuries, which has lately found imitators.

This kind of plastering was used externally, and instances of it occur in Essex, Norfolk, Suffolk, Sussex, Hampshire, and other counties where timbered houses are found. Ornamental parget-work was generally employed between the studs of timber houses in the Tudor and Stuart times. The ornament was often of figures and foliage raised or in relief, as we find in some old buildings at Ipswich, Maidstone, etc., and more frequently of patterns incised or sunk in the plaster, such as may be seen in a few old houses in Newark, Shrewsbury, Coventry, and in many places in Essex. We have found little information respecting the composition of such plaster-work; but there is no doubt that the devices were either cut, modelled, or impressed upon the plaster when wet. The *modus operandi* was doubtless the following: A board of the size of the panel or ornament was obtained, in which were stuck pins in the shape of the device, and this was pressed on the wet plaster, and completed by hand.

Many of these timbered houses are filled in with rough-cast, a plaster in which sharp stones are mixed, or these are thrown forcibly from a trowel against the wet plaster. We find on many of the old manor-houses dating from Tudor times, "rough-cast," and this appears to have been made of lime, hair, and coarse sand, with small pebbles intermixed. Glass and brick fragments are often found in lieu of the pebbles. This kind of plaster was very durable, and has lasted to our day in tolerable preservation. Many recent attempts have been made to imitate the rough-cast panel-work of the period to which we have been referring, though we question if the modern work will stand so long. Rye-straw has been found in specimens of old plastering, and there is no doubt fibre of some kind was mixed in it.

The ceilings of the sixteenth, seventeenth, and eighteenth centuries have long been the theme of admiration, and in spite of our *papier maché* and *carton pierre*, few modern ceilings equal those of earlier date. The Italian designs, introduced in the Stuart period, no doubt brought with them Italian stuccoists who were equal to the occasion. The Adams, Chambers, and Wyatt led the way for the light, tasteful relief-ceilings we have lately been reproducing in our buildings, and the acme of ceiling-decoration appears to have been reached by these later artists. It must not be overlooked that these examples were worked chiefly by hand. Casting in plaster-moulds followed, and a revolution quickly set in. Casts of original ornaments and figures superseded hand-carving, and plastering became a mere mechanical art. Even in this art of casting in plaster changes have crept in which have deteriorated the quality of the enrichments. The "jelly mould," as every plasterer knows, does not produce such sharp relief as plaster or lead moulds did, which were in several portions, though we have seen many ceilings executed in *carton pierre* which, for sharpness and relief, equal hand-work. The worst of stamped and moulded work is that a spiritless kind of repetition is apt to be followed, and we find very many of the newly-built houses with parquet-work overdone with commonplace devices. It is perhaps to be regretted our architects do not follow the plaster-work found in Italy and Spain, and Mr. Street, writing on the subject in his "Gothic Architecture in Spain," alludes to the tracery patterns of Late Gothic, which are repeated to produce a diaper in the Alcazar at Segovia, and other buildings. All the Moorish decorative work was executed in plaster of fine quality, but cut and carved, so there is, as the same authority remarks, endless variety. We have another kind of decorative plaster. "sgraffito," an instance of which will be seen in the panneling at the National School for Music, near the Albert Hall, at South Kensington; but we are inclined to think the experiment will not be soon followed. This kind of incised ornament is exceedingly obtrusive, and we are disposed to prefer the less decided relief of the plaster itself to such glaring panel treatment. The subject is one intimately bound up with the future of cement concrete. — *The Building News.*

BALLOON FRAMES.

MINNEAPOLIS, December 10, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In the note upon "Balloon Frames," published in your issue of December 3, the last clause, reading "three-inch boarding and two-inch dimensions," should read as follows: "Inch boarding and two-inch dimensions." FREDERIC G. CORSER.

THE ATLANTA EXHIBITION.

BOSTON, December 27, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In response to your request to give you a statement of any points of interest to architects in connection with the Atlanta Exposition, now about to close, I beg you to write to Col. J. B. Kilkbrew, of Tennessee, who had charge of the railway annex, for a description of the timber and building stores. There were, I believe, one hundred and sixty-five varieties of wood exhibited by one railway corporation from their line, and many examples of stone, especially of marble, attracted my attention.

I beg to call your especial attention, however, to the main exhibition-building, of which I have not an exact picture, but which was constructed substantially according to plans sent from here. The principal change was in the monitor or lantern upon the roof, which was constructed lengthway, instead of crossway — a cheaper plan, but not so good for light.

The problem was to plan a building which could be enlarged or extended indefinitely, if the applications for floor-space happened to exceed the proposed size of the building. I enclose copies of the original plan, which was enlarged before operations were begun to a structure 90′ x 750′ one way, and 90′ x 500′ the other; the centre 100′ x 100′ being two stories in height. You will observe that all the parts of the wings or arms are interchangeable. The contract price of this building was $45,000. It was 108 days from the time the ground was broken until the day on which the exhibition was opened; in about 20 days more all the shafting was in operation.

Several additional buildings were built; one large one completed in three weeks from the time the timber was cut. Some of these were separate, but the director-general told me that the result of his experience would be to unite all parts of any exhibition under one roof, which could be done upon level ground to an indefinite number of acres.

It should be observed that the building is amply strong for any kind of textile machinery. It can be used where it is, a suitable top floor being laid, or it can be taken apart without injury to any of the material except the outside covering of the roof,[1] and put up again in sections.

Such a building is not of course imposing, but may be made very picturesque by the skilful use of color, and I think it would be the unanimous testimony of all exhibitors that it gives the greatest available space, the best light, and the utmost convenience possible.

In these days of corporate enterprise it might be expedient for a company to own an exhibition-building of moderate size, to be moved from place to place as occasion might require. E. A.

PROTECTION OF BOSTON THEATRES.

BOSTON, January 3, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Mr. Damrell, Inspector of Buildings, has required perforated pipes, as described on page 309 as used at Rouen, in all our Boston theatres, with unlocked valve near gas-table: they have been in for two years at least. A. C. WALWORTH.

THE LENGTH OF A POST.

NEW BEDFORD, MASS., January 2, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Can you tell me what constitutes the length of a post to a building: whether from bottom of sill to top of plate, or top of sill to top of plate, or top of sill to under side of plate? Please reply soon, and oblige, L. K.

[The length of posts is a most uncertain quantity, and we have always expressly noted in specifications that it should be taken to mean the height from top of sill to under side of plate, which seems the only rational interpretation, but it is certainly common, and perhaps most usual, to apply the expression as indicating the whole height of the frame, from the stone-work to the top of the plate. — EDS. AMERICAN ARCHITECT.]

A BOOK OF DESIGNS.

CLEVELAND, O., December 19, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I am desirous of buying a work on Architecture, and Mr. Forney, of the *R. R. Gazette*, has advised me to write to you. I am a railroad civil engineer, and want a book, not too elaborate, with good practical suggestions, which would help me form correct tastes, and at the same time give me useful hints in designing buildings that one in my profession is constantly called upon to build, such as frame and brick dwellings, station-houses, etc.

Yours, etc. AUG. MORDECAI.

[Modern Architectural Designs and Details, published by Wm. T. Comstock, 194 Broadway, New York, is perhaps the best book for such purposes. — EDS. AMERICAN ARCHITECT.]

[1] If painted duck is used, even this loss need not occur.

STORAGE OF WATER.

To the Editors of the American Architect: —

Perhaps some one can state how much storage for water is required for an ordinary twelve or fourteen room country dwelling-house where there are no water-works. Supposing, for instance, that such a house has 5,000 square feet of roof surface, and that the annual rain fall is 3 feet; this, of course, would make 15,000 cubic feet of water, and the question is, what number and size of cisterns should be made to store this water, allowing for waste and use?

C. C.

[Much depends upon the climate. In some localities showers are frequent in summer, and a small tank will be kept constantly well filled; while in others not far off, but subject to different wind-currents, the same amount of rain may fall, but in a few heavy storms, which would cause a small tank to overflow, and perhaps leave it empty before another opportunity for filling it occurred. According to our experience, the practice varies from two thousand gallons of storage capacity for cisterns for the very smallest houses to ten or twelve thousand for larger ones. Where plumbing is introduced in the house, the size of the cistern must be much more than doubled. The safest way is to estimate for storing half the annual rainfall at once. The capacity of circular cisterns is estimated by multiplying the square of half the diameter in feet, by 3, and this product by the depth in feet, which will give the contents in cubic feet. Seven and one-half times this will be the capacity in gallons. Usually a single large cistern is more economical to build than two smaller ones of equivalent volume. — Eds. American Architect.]

NOTES AND CLIPPINGS.

A New Electric Railway near Berlin.—Dr. Siemens has finished a second electric railway near Berlin. The new line, connecting Charlottenburg with Spandau, was recently subjected to a trial which established its success. The distance was accomplished in remarkably short time, and without the least interruption.

Revival of Fresco-Painting.—A revival of fresco-painting for the external decoration of private houses is taking place in South Germany. Meanwhile, the older historic frescoes at Munich, in the Hofgarten arcades and on the new Pinakothek, have fallen into hopeless decay. Those on the Isarthor, by Bernard von Nahers, representing the entry of the Emperor Ludwig into Munich after the battle of Mühldorf, though sadly damaged by "restoration" some years ago, have been recently subjected to a process of preservation, the invention of a local chemist, which promises to render permanent their present condition. The peculiarity of this process of preservation is that it allows the frescoes to be cleaned by washing. — *Exchange.*

Age of the Mississippi Delta. — The Philadelphia *Telegraph* states that an examination of the delta of the Mississippi shows that, for a distance of about 300 miles of this deposit, there are buried forests of large trees, one over the other, with interspaces of sand. Ten distinct forest growths of this nature have been observed, which must have succeeded one another. These trees are the bald cypress of the Southern States. Some have been observed over twenty-five feet in diameter, and one contained 5,700 annual rings. In some instances, too, these huge trees have grown over the stumps of others equally large. From these facts geologists have assumed the antiquity of each forest growth at 10,000 years, or 100,000 for the whole. This estimate, however, would not include the interval of time — which doubtless was very considerable — that elapsed between the ending of one of these vast and wonderful forests and the beginning of another.

The Siemens Regenerative Gas-Burner. — One of the results of the introduction of electric lighting has been to stimulate invention in the direction of improved gas illumination, and, as a consequence, several practical improvements have been introduced in gas-burners, as has been recorded by us from time to time. The latest advance in this direction which has been brought under our notice is that made by Mr. F. Siemens, of Dresden, and Dr. C. W. Siemens, of London, who some time since entered upon a long series of experiments with gas as an illuminant. The result has been the development of a perfectly new method of burning gas for illuminating purposes, which is now known as the regenerative system. The distinguishing characteristics of the new burner are increased illumination, with a corresponding economy in the consumption of gas, perfect ventilation, and complete combustion. The products of combustion are continuously returned by a downward current to the interior of the burner itself, and there utilized to heat a fresh supply of gas and air prior to their use at the orifice of the burner. We recently examined some of the regenerative burners at the offices of the Siemens Gas-Light Company, No. 40 Queen Victoria Street, London, where they were giving excellent results. The burner consists mainly of three concentric metallic chambers, into one of which — the intermediate one — the gas is delivered from the supply-pipe, passing through a series of very small vertical tubes, at the tops of which it is ignited and burned. At this point the gas mingles with a current of air which has been heated by passing through the chamber surrounding the gas-chamber, which is also heated. Within the ring of gas-jets is a tube which opens downward into the third or central chamber. After rising for a short distance, the luminous band of flame, produced by the gas and heated air, curves over the top edge of this inner tube, and is sucked down into the inner chamber, which it heats. The products of combustion pass away through an exit tube, heating on their way the chambers through which the gas and air are passing to the commingling point. The intimate mixture of the gas and air is insured by means of deflectors. The success of the system has led to its adoption in Germany, France, and other countries, while in England, Mr. T. W. Keates, the consulting chemist to the Metropolitan Board of Works, after careful investigation, reports that the results are better than any he has known to be obtained with any gas-burner hitherto invented. These burners will be used in illuminating the conservatory of the Horticultural Society at South Kensington, in connection with the Smoke Abatement Exhibition. — *London Times.*

The Mosque at Jerusalem to be Restored. — Some of the London papers have contained a wonderful account of the Sultan having been moved by members of the Imperial House of Hapsburg to take in hand the restoration of "Solomon's Temple," and calls upon Jews and Christians alike to bear gratitude to his Imperial Majesty Abdul Hamid for having taken measures to carry out that "generous project." No wonder that our friends in England at once wrote to us here to inquire what was really happening, and I hope you will allow me to inform them, and your readers in general, of what grain of truth is imbedded in this captivating and romantic paragraph. There is no need to say that the ruins of Solomon's Temple are not about to be restored. No such ruins exist. But the Great Mosque and the whole inclosure within which it stands — commonly called the "Temple area" — are to be restored, and by no means too soon, for, in spite of the great annual income of this important Mohammedan sanctuary, it has been for years neglected. The Crown Prince Rudolph, of Hapsburg, has had something to do with the repairs within the "Temple area," but not in the manner represented by your contemporaries. When he visited Palestine, a Turkish general, Ferik Pacha, was sent here to receive him and do the honors of the Government. Ferik was somewhat shocked at the condition in which he found the Great Mosque and its surroundings, and his representations on his return to Constantinople were happily not without effect in bringing about the present repairs. As yet they are quite in an incipient condition, and it is difficult to guess when they will be properly carried on. The gentleman who arrived here from Constantinople to superintend the work has made an estimate of the maximum cost, dividing all that has to be done into twenty-eight separate items. This maximum estimate, which amounts to something like £10,000, he submitted to a number of intending contractors, among whom were two German architects, for the purpose of receiving from them, according to the fashion of Dutch auctioneers, the offer of the lowest price at which they are prepared to do the work. The two German architects retired at once from the contest, finding that even at the maximum estimate the work could not be done thoroughly. The Arab competitors, who were less scrupulous, and relied upon making a profit by doing inferior work, clubbed together and charged a gentleman to accept the job for them in his own name, promising him a share of the profit in consideration of his obtaining the order for them. This offer being submitted to the Governor of Jerusalem for acceptance was rejected by him on the ground that only builders or architects could be contracted with. The gentleman from Constantinople is thus, for the present, at a loss how to get the work done, and is satisfied to while away the time by employing day laborers to do some preparatory work. How it will end, and whether we shall really see the intended repairs done, is as yet very problematical. — *The London Standard.*

Redwood. — A San Francisco correspondent of the *Scientific American* says: "Somehow or other an erroneous article from a local paper here, called the *Scientific and Mining Press*, in relation to the durability of redwood, has found its way into the columns of your paper. Redwood, when exposed to alternations of wetting and drying, will not last more than three to five years before it is completely rotted. I am a bricklayer by trade, and have had about seventeen years' experience in this city of redwood houses, and I am certain of what I say. As regards putting redwood under brick walls, it is never done now-a-days, and, in fact, never was done in any important structure. Where plank foundations are used here is on made land, in the region of the city front, and then they use plank of what is called Oregon pine, three inches thick; and this planking is supposed to be placed deep enough to be covered at all times with water, so as to exclude the air. Done in this way, I have seen some planks that had been down twenty-five years, and they were perfectly sound. Redwood placed deep enough in water to exclude air will also last for I do not know how long. Within the last few years a great many houses that had been built of redwood, with 4″ x 4″ redwood posts, resting on a 3″ plank of redwood for a foundation, have had to be placed on screws and a brick foundation put under them. The wooden houses here are numerous, so there is every chance to see how long redwood will last. I have seen the redwood stringers and sleepers of the street railroads taken up completely rotted after five years."

Builders' Promises. —What is a builder's promise? Riding down in the horse-cars, the other morning, we heard one of the committee on the new Art-Club building ask a contractor about the completion of certain work. "That is not done yet," was the response. "Why, you promised to have that done before now. I have it in writing. Here [feeling in his pockets] is your letter in which you say you will." The committee-man looked at the contractor with astonishment and inquiry in his face. "Oh, that is a builder's promise," was the rejoinder, and with an indifferent air as though it were of the least possible consequence to anybody. "'A builder's promise?'" repeated the other — "is not that as obligatory as any other?" "No! it means it will be done if it is possible, controlled by circumstances." "My dear man," said the committee-man, with some warmth, "what do you suppose would become of me, a merchant, if I wrote down that I would do a certain thing, in a business transaction, by a certain day, and then repudiated the promise, neglected to attend to the matter, and cavalierly answered that it was contingent on other circumstances? I should be hooted out of all respectable business circles and my name made a synonym of falsity and imposition! Why should a builder's promise be any less sacred than a merchant's?" It was not so in the olden time, and should cease to be so now; but, unfortunately, it is notorious that, as a general rule, no reliance to-day can be put on a builder's agreement as to the completion of work. — *Boston Commonwealth.*

Snow-Slides from Roof. —A Canadian has recovered a verdict for $150 damages against the Trustees of the First Baptist Church of Montreal, a horse, frightened by snow falling from the church, having collided with his sleigh to his personal injury. He lost his case on its first hearing. The Court of Review reversed that decision, and awarded $150 damages, and the Court of Appeals has now sustained the latter judgment by a majority of the judges.

BUILDING INTELLIGENCE.

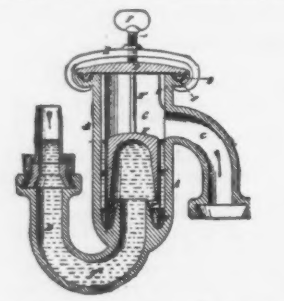
(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

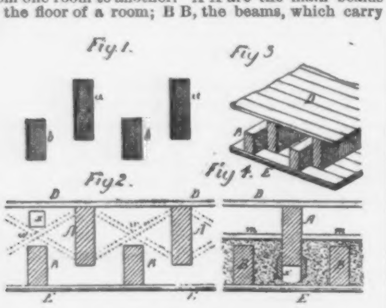
[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

245,011. Trap for Wash-Basins.—Andrew W. Nicholson, Brooklyn, N. Y. This invention relates to a fluid-trap. It is intended to allow the passage of fluids through it one way and to prevent the passage of fluids through it the other way. The seal is quicksilver and the trap works automatically. A is the body of the trap. B is the inlet and C is the outlet to the waste-pipe. D is the cap of the trap, screwed to its place by means of the clamp E and screw F. At the top of the trap is a flanged projection, *g*, in which is a groove, *f*, and into this groove the cap D fits loosely, as shown at *e e*. This groove *f* is charged with quicksilver, to prevent the escape of any gas from the body of the trap. G is the main chamber of the trap, and the inlet-pipe B is extended up above the bottom of the chamber G, so as to form a reservoir or deposit, H, around the end of the inlet-pipe B, within which the quicksilver is deposited at J. K is an inverted cup, the edges of which rest in the reservoir H, and it floats or rests by its own gravity in or on the quicksilver when the trap is not automatically opened by the force of the current flowing through it. The operation of the trap when applied to wash hand-basins is as follows: When the basin of water, which is above the level of the extended pipe B within the chamber G, is discharged of its water, the pressure of the water upon the inside of the inverted cup K raises



it within the chamber G sufficiently to permit the water to flow past the outlet C and be discharged into the waste-pipe. When the basin is discharged of its water the inverted cup K again descends and its edges again rest in or on the quicksilver in the reservoir H, thereby securely sealing automatically the trap, so that no gas can pass from the waste-pipe to the basin. The water in the trap is thereby separated by the quicksilver into two distinct portions, the one portion, L, of the water being above or on the outlet side of the quicksilver, and the other, F′, below or on the inlet side of the quicksilver, so that should the water exposed to the action of the sewer-gas on the outlet side of the trap become contaminated the water on the inlet or basin side of the trap would be pure or free from such contamination, or, in absence of the water-seal, the quicksilver-seal is ample. The inverted cup K should be a trifle heavier than the water it displaces when immersed in water with its mouth downward, to insure the descent of the cup and allow its edge to rest in or on the quicksilver.

249,645. Construction of Buildings. — John B. Love, Philadelphia, Pa. The object of this invention is to so arrange two sets of beams, one set for supporting the floor and the other for carrying the ceiling, and to so isolate them from each other that shocks and jars imparted to the floor will not be imparted to the ceiling below, and so that the structure may, in a great measure, prevent the communication of noises from one room to another. A A are the main beams of the floor of a room; B B, the beams, which carry



the ceiling E of the room below. These main beams are built into the opposite walls at points shown at *a a*, Fig. 1, and the beams B B at points *b b*, Fig. 1, so that the beams of one set shall be situated between those of the other set, thus permitting the beams A to extend downward below the upper edges of the beams B, an arrangement which diminishes the depth of the structure. The usual flooring-boards D are secured to the top of the main beams in the ordinary manner, and the laths for the plaster of the ceiling E are secured to the under side of the beams B B. The two sets of beams are entirely isolated from each other. As a still further bar to communication of noises from one room to another, saw-dust or spent tan may be deposited in the space between the two structures, either the entire space being filled, or the saw-dust deposited in masses between the beams B B, as shown in Fig. 4, strips *x′ x′* being secured to the main beam to maintain the saw-dust in a dispersed condition and prevent it from accumulating in masses; or, if desired, partition *m m* may extend from main beam to main beam, and saw-dust may be lodged between these partitions and the ceiling or floor.

251,346. Compound for Preserving Wood, etc. — Willard C. Bruson, Chicago, Ill.

251,349. Dovetail Tonguing and Grooving Machine. — Franklin Chichester, Milwaukee, Wis.

251,457. Door-Spring. — Patrick K. O'Lally, Boston, Mass.

251,491. Door-Check. — George W. Winters, Knoxville, Iowa.

251,524. Bevel-Square. — Ernest V. Clemens, Ansonia, Conn.

251,528. Fire-Proof Shutter. — Geo. L. Damon, Boston, Mass.

251,588. Whitewash from Lime. — Charles C. Hughes, Avondale, Pa.

251,589. Automatic Gate-Hinge. — Wesley Hull, Fort Wayne, Ind.

251,591. Spring-Hinge. — Gustav L. Jaeger, New York, N. Y.

251,609. Shutter-Worker. — William T. Faunt le Roy and John D. Summers, Evansville, Ind.

251,623. Wood-Working Vise. — James M. Montgomery, Jr., Columbus, Ohio.

251,635. Wrench. — Herbert W. Reed, Ware, Mass.

251,637. Building. — John R. Rhinehart, Carlyle, Pa.

251,649. Sash-Holder. — Alonzo B. Sprague, New York, N. Y.

251,662. Calipers. — George B. Webb, Thomaston, Conn.

251,676. Paint for Roofs, etc. — Atwater E. Brockett, Branford, Conn.

SUMMARY OF THE WEEK.

Baltimore.

House. — Mr. Chas. E. Cassell, architect, has prepared drawings for a dwelling, 20′ x 67′, to be built cor. of Biddle and Calvert Sts., for Mr. Solomon Corner. The building will have two stories, mansard roof and basement, be faced with white marble, and cost $15,000.

Building Permits. — Since our last report six permits have been granted, of which the more important are as follows: —

Darby & Co., additional st'y to warehouse, s e cor. Baltimore and Howard Sts.

Jos. M. Cone, 5 three-st'y brick buildings, Arlington Ave., beginning at the n e cor. George St.

Wm. Reid, two-st'y brick building, s e cor. Carlton St. and Harmony Lane.

A. J. Abell, two-st'y brick building, 26′ x 35′, German St., in rear of No. 499 Baltimore St.

Boston.

Theatre. — The new theatre which Mr. Fred Vokes is about to build will, it is said, be located on Temple Place.

Freight-Station. — The Eastern Railway is laying the foundation for an immense freight-station on Rutherford Avenue.

December Report. — During December, 10 brick and 73 wood permits were granted at the office of Inspector of Buildings.

The report for the year will not be ready for two or three weeks, but comparing the permits granted during 1881 with those of 1880, there has been considerable advance. Brick permits are about equal; wood permits show an advance of about 40 per cent, and those for alterations and repairs an advance of about 50 per cent.

Building Permits. — *Brick.* — *Tremont St.*, cor. Castle St., Ward 16, for Boston & Albany R. R. Co., milk depot, 29′ x 342′, two-and-three-st'y; Rummery & Maxwell, builders.

Kingston, Bedford, and Columbia Sts., Ward 10, for Eben D. Jordan and Charles Marsh, mercantile, 96′ 1″ x 159′ 4″, 104′ 7″ x 190′ 8″, six-st'y; Mr. T. E. Stuart, builder.

Curve St., near Broadway extension, Ward 12, for Geo. S. Johnson, stable, 55′ x 176′, and 78′ x 212′, three-st'y.

Leverett St., near Charles St., Ward 8, for D. F. Flagg, store and dwell., 18′ x 28′ 6″, one-st'y and mansard; Maurice Damon, builder.

Wood. — *Medford St.*, rear of, nearly opposite Polk St., Ward 3, for O. S. Clark and G. L. Smith, saw-mill, 35′ x 60′; Geo. M. Starbird, builder.

Old Harbor Point, Ward 24, for City of Boston, pumping-station, 46′ 6″ x 51′ 6″, storehouse, 50′ x 75′, and storage of cement, 27′ x 69′; Thomas Keyes, builder of above. Stable and wagon-shed, 20′ 6″ x 45′; storage of cement, 20′ x 26′ 3″, and 26′ 3″ x 56′ 3″, two-st'y; and storage, 34′ 6″ x 49′ 6″; saw-mill, 20′ 3″ x 25′ 6″ and 13′ x 21′; and tool-house, 11′ x 15′ 4″; Geo. Souther, builder.

Heath Pl., near Minden St., Ward 22, for John Bleiler, stable, 16′ x 24′; Frank A. Schell, builder.

Water St., Ward 5, for Hoosac Tunnel Dock and Elevator Co., office-building, 26′ x 76′, two-st'y; M. T. Sprague, builder.

Bailey St., rear of, near Washington St., Ward 24, for Wm. McCarty, stable, 12′ x 18′; Wm. McCarty, builder.

Church St., near Brooks St., Ward 1, for John F. Slattery, dwell., 22′ x 32′, two-st'y; John F. Slattery, builder.

White St., No. 43, Ward 1, for J. Henry Stephenson, dwell., 21′ x 30′, two-st'y; J. Henry Stephenson, builder.

Monmouth St., No. 52, for J. Henry Stephenson, dwell., 21′ x 30′, two-st'y; J. Henry Stephenson, builder.

Wood. — *Jamaica St.*, near Woodman St., Ward 23, for John Patten, dwell., 18′ x 24′, two-st'y; Melvin D. Ayers, builder.

Boston St., near Warren St., Ward 21, for Winthrop Walcott, 2 dwells., 22′ 6″ x 31′; ell, 18′ x 18′, two-st'y.

Old Harbor Point, Ward 24, for N. F. Palmer & Co., pattern-shop, 20′ x 50′; J. B. Keene, builder.

Old Harbor Point, Ward 24, for N. F. Palmer & Co., machine-shop, 26′ 4″ x 60′ 6″; J. B. Keene, builder.

Old Harbor Point, Ward 24, for City of Boston, dwell., 36′ x 74′ 6″, dwell. and storage, 21′ 6″ x 80′.

West Sixth St., near D St., Ward 3, Patrick Brady, dwell., 20′ x 30′, three-st'y.

Armory St., rear, near Codman Ave., Ward 23, for Burgess & Perry, mill, 33′ x 96′; 3 ells, 22′ x 25′, 22′ x 45′, and 10′ x 20′; Creesy & Noyes, builders.

Armory St., rear, near Codman Ave., Ward 23, for Burgess & Perry, foundry, 44′ and 64′ x 210′.

Unnamed St., nearly opposite Stark St., Ward 4, for Richard S. Barrett, dye-house, 40′ x 100′ three-st'y; N. M. Hunnewell, builder.

Shawmut Ave., Nos. 829-831, Ward 19, for Highland St. R. R. Co., storage of plows, 24′ x 174′.

Swett St., rear of, near New York & New England R. R., Ward 20, for Bradley Fertilizer Co., stable and shed, 24′ x 100′ and 35′ x 100′, two-st'y; Bradley Fertilizer Co., builders.

Cambridge St., cor. Perkins St., Ward 4, for Powers, Melvin & Co., storage of grain, 25′ x 30′ 4″ and 71′ x 75′; T. C. Woodworth, builder.

Note. — The six last-mentioned permits are special permits granted by the City Council, December 31, 1881.

Brooklyn.

Hospital. — The plans for the building of the Methodist Episcopal Hospital have been adopted. They were prepared by Mr. John Mumford. The hospital is to cost between $400,000 and $500,000. The hospital will be built on the block bounded by Seventh and Eighth Avenues, and Sixth and Seventh Sts., South Brooklyn.

Building Permits. — *Herkimer St.*, s s, 495′ e Bedford Ave., three-st'y brownstone dwell.; cost, $7,000; owner and builder, Andrew Miller, 1527 Pacific St.; architect, Amzi Hill.

Utica Ave., e s, 75′ s Atlantic Ave., 7 two-st'y frame dwells.; cost, each, $2,500; owner, Peter Sullivan, Lewis Ave., cor. McDonough St.; architect, Amzi Hill; builder, W. S. Montgomery.

De Kalb Ave., s s, between Fulton St. and Hudson Ave., four-st'y brick stable and dwell.; cost, $5,000; owner, J. M. Horton Ice Cream Co.

Chauncey St., n s, about 100′ w Patchen Ave., 3 one-st'y frame dwells.; cost, each, $2,000; owner, estate A. July, J. G. Ward, agent; architect, A. Hill; builder, J. G. Ward.

William St., s s, 175′ w Van Brunt St., two-st'y brick office-building; cost, $4,000; owner, Pioneer Iron Works, William St.; architect, W. B. Frank; builders, P. Carlin & Son and George Damen.

Flushing Ave., s s, 75′ w Bremen St., three-st'y frame store and tenement; cost, $2,800; owner, Henry Stebing, 30 Montieth St.; builder, Henry Kempf.

Alterations. — *Atlantic Ave., Nos.* 1050 *and* 1052, between Clason and Grand Aves., one-st'y frame stable and shed; cost, $3,000; owner, Estate of A. Chichester; architect and builder, James McKee.

Cincinnati.

The Year. — During the year this makes, according to the records of the Board of Public Works, a total of 572 permits, at a total cost of $1,851,550. This however by no means exhibits the true amount of work done in this city during the past year. As we have before stated, there is in this city no officer charged with the surveillance of the erection of new buildings. To be sure, the police are supposed to see when a building is being erected, that the contractor has a permit to occupy the street, but in the outskirts, where there is little travel, the police seldom trouble themselves about this matter, and so it happens that in order to save a dollar (the amount charged for each permit) that no permit is taken out where it can possibly be avoided, and even when the permit *is* taken out, it is seldom indeed that the correct amount of the cost of the building is given. In view therefore of the above facts, it would be on the side of safety to put the permits at 1, 00, and the cost thereof at say $4,500,000.

Labor and Materials. — The cost of both labor and materials are considerably higher than last year, and the "oldest inhabitant" says, higher than any time since the war. Be this as it may, bricklayers are getting $4 per day; common brick are $10.50 per thousand; Zanesville pressed brick are $26 per thousand, and it costs about as much more to lay them; carpenters get $2.50 per day. Rough lumber, yard-sizes, is $21 per thousand, and threatens to go higher. Limestone for rough work is $4 per perch, and for fine face work is $7 to $8. The mason getting $3 per day. Lath are $3.50 per thousand and scarce. Plastering for lathed work is 25 cents per square yard. Plumbers get $3.50 per day, or should do so, for good ones. Painting and glazing have not advanced much.

Take it altogether, building is fully 33 per cent higher than it was two years ago, and there is some talk of still greater advances.

Building Permits. — During the week one permit was issued to J. W. Ashar to build 5 three-st'y stone-front dwelling-houses on Longworth St., costing $18,000.

Chicago.

Building Permits. — Albert Crane, 6 one-st'y brick cottages, 20′ x 26′ each, Emerald Ave., near Twenty-ninth St.; cost, $5,000 each.

C. R. Hickock, 2 two-st'y and basement brick dwells., 33′ x 48′, 3530 and 3532 Forest Ave.; cost, $5,000.

(Continued on next page.)